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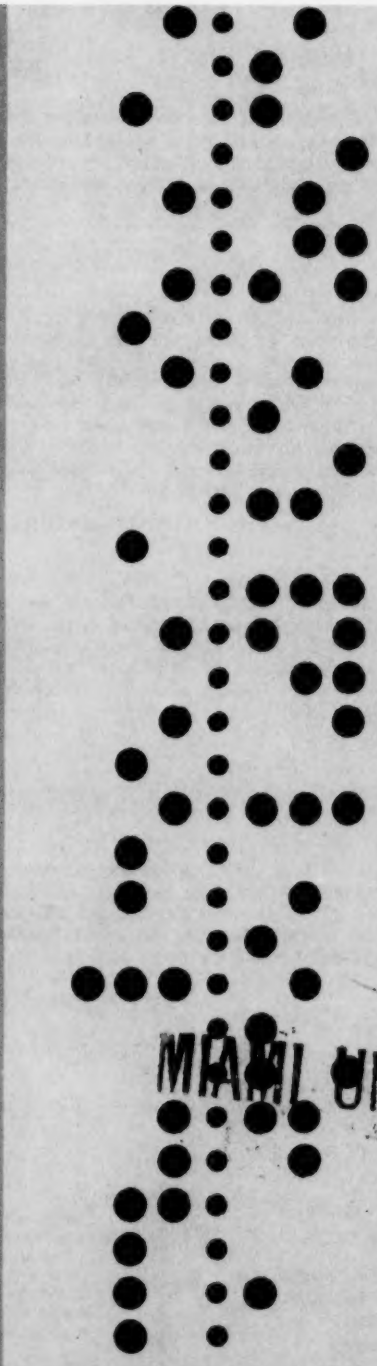
May 10, 1966

U.S. GOVERNMENT

RESEARCH & DEVELOPMENT REPORTS



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Semi-Monthly Journal

- *Abstracts of R & D Reports*
- *List of Current R & D Projects*
- *Indexes*

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May 10, 1966 / Volume 41, Number 9

U.S. Government

RESEARCH AND DEVELOPMENT REPORTS

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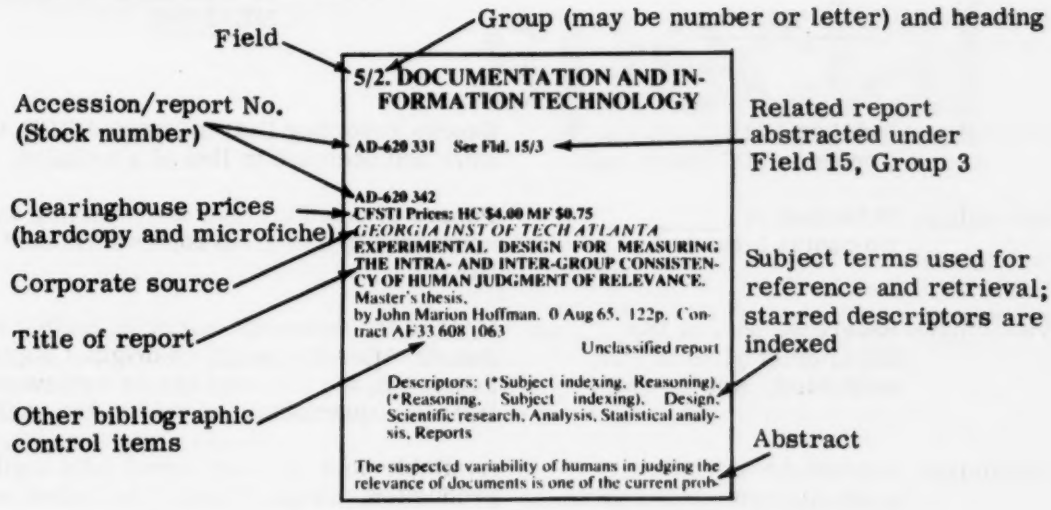
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Abstract
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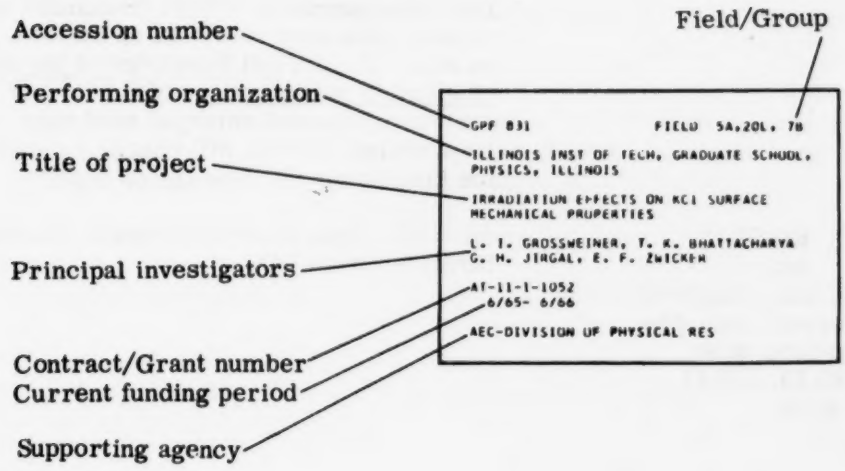

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SUBJECT CATEGORY HEADINGS

01	AERONAUTICS Includes aerodynamics; aeronautics; aircraft; aircraft flight control and instrumentation; and air facilities.	1, S-1
02	AGRICULTURE Includes agricultural chemistry; agricultural economics; agricultural engineering; agronomy and horticulture; animal husbandry; and forestry.	2
03	ASTRONOMY AND ASTROPHYSICS Includes astronomy; astrophysics; and celestial mechanics.	2, S-2
04	ATMOSPHERIC SCIENCES Includes atmospheric physics and meteorology.	4, S-3
05	BEHAVIORAL AND SOCIAL SCIENCES Includes administration and management; documentation and information technology; economics; history, law and political science; human factors engineering; humanities; linguistics; man-machine relations; personnel selection, training, and evaluation; psychology (individual and group behavior); and sociology.	8, S-4

06 BIOLOGICAL AND MEDICAL SCIENCES 16, S-6

Includes biochemistry; bioengineering; biology; bionics; clinical medicine; environmental biology; escape, rescue, and survival; food; hygiene and sanitation; industrial (occupational) medicine; life support; medical and hospital equipment and supplies; microbiology; personnel selection and maintenance (medical); pharmacology; physiology; protective equipment; radiobiology; stress physiology; toxicology; and weapon effects.

07 CHEMISTRY 26, S-8

Includes chemical engineering; inorganic chemistry; organic chemistry; physical chemistry; and radio and radiation chemistry.

08 EARTH SCIENCES AND OCEANOGRAPHY 39, S-10

Includes biological oceanography; cratography; dynamic oceanography; geochemistry; geodesy; geography; geology and mineralogy; hydrology and limnology; mining engineering; physical oceanography; seismology; snow, ice, and permafrost; soil mechanics; and terrestrial magnetism.

09 ELECTRONICS AND ELECTRICAL ENGINEERING 43, S-12

Includes components; computers; electronic and electrical engineering; information theory; subsystems; and telemetry.

10 ENERGY CONVERSION (Non-Propulsive) 51, S-13

Includes conversion techniques; power sources; and energy storage.

11 MATERIALS 52, S-14

Includes adhesives and seals; ceramics, refractories, and glasses; coatings, colorants, and finishes; composite materials; fibers and textiles; metallurgy and metallography; miscellaneous materials; oils, lubricants, and hydraulic fluids; plastics; rubbers; solvents, cleaners, and abrasives; and wood and paper products.

12 MATHEMATICAL SCIENCES 58, S-17

Includes mathematics and statistics and operations research.

13 MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING 63, S-17

Includes air conditioning, heating, lighting, and ventilating; civil engineering; construction equipment, materials, and supplies; containers and packaging; couplings, fittings, fasteners, and joints; ground transportation equipment; hydraulic and pneumatic equipment; industrial processes; machinery and tools; marine engineering; pumps, filters, pipes, tubing, fittings, and valves; safety engineering; and structural engineering.

14 METHODS AND EQUIPMENT 67, S-18

Includes cost effectiveness; laboratories, test facilities, and test equipment; recording devices; reliability; and reprography.

15 MILITARY SCIENCES 71, S-20

Includes antisubmarine warfare; chemical, biological, and radiological warfare; defense; intelligence; logistics; nuclear warfare; and operations, strategy, and tactics.

16 MISSILE TECHNOLOGY 72, S-20

Includes missile launching and ground support; missile trajectories; missile warheads and fuzes; and missiles.

17 NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES 72, S-20

Includes acoustic detection; communications; direction finding; electromagnetic and acoustic countermeasures; infrared and ultraviolet detection; magnetic detection; navigation and guidance; optical detection; radar detection; and seismic detection.

18 NUCLEAR SCIENCE AND TECHNOLOGY 74, S-21

Includes fusion devices (thermonuclear); isotopes; nuclear explosions; nuclear instrumentation; nuclear power plants; radiation shielding and protection; radioactive wastes and fission products; radioactivity; reactor engineering and operation; reactor materials; reactor physics; reactors (power); reactors (non-power); and SNAP technology.

19 ORDNANCE 75, S-23

Includes ammunition, explosives; bombs; combat vehicles; explosions, ballistics, and armor; fire control and bombing systems; guns; rockets; and underwater ordnance.

20 PHYSICS 77, S-24

Includes acoustics; crystallography; electricity and magnetism; fluid mechanics; masers and lasers; optics; particle accelerators; particle physics; plasma physics; quantum theory; solid-mechanics; solid-state physics; thermodynamics and wave propagation.

21 PROPULSION AND FUELS 105, S-28

Includes air-breathing engines; combustion and ignition.

22 SPACE TECHNOLOGY 106, S-29

Includes astronautics; spacecraft; spacecraft trajectories and reentry; and spacecraft launch vehicles and ground support.

RESEARCH highlights

Reports of current high industrial interest

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Biological and Medical Sciences

EYE MEASUREMENTS TAKEN BY ULTRASONOGRAPHY AND PHAKOMETRY

(Order Stock No. AD-629 079 Ultrasound and Phakometry Measurements of the Primate Eye, HC $2.00/MF $0.50.)

Ultrasonography and ophthalmophakometry have been used at Washington State University's Primate Research Center to obtain measurements of the radius and power of the cornea, depth of the anterior chamber, radius and power of the lens surfaces, equivalent power, lens thickness, total power of the eye, and the axial length. Eyes of 53 male and 40 female chimpanzees ranging in age from 2 to 15 years were measured and compared with human eyes of a comparable sex grouping using the same methods. The intercorrelations between methods are not quite as high on the chimpanzees as on the humans, but the correlations between the measures of axial length and the vertical ocular refraction are virtually identical for the two groups. The Washington State study describes both the ultrasound apparatus and the phakometer used and adds that ultrasound is the method of choice since it does not require as much time to make the measurement or to calculate the result as does phakometry. Furthermore, it does not require the rigid degree of control over the animal's behavior that phakometry requires, and its flexibility allows measurement in situations in which it would be impossible to obtain phakometry measurements.

SYMPOSIUM PAPERS ON BIOLOGY AND COMPUTERS PUBLISHED

(Order Stock No. N65-28750-77 Symposium on the Analysis of Central Nervous System and Cardiovascular Data Using Computer Methods, HC $4.50/MF $2.50.)

Papers presented at the Symposium on the Analysis of Central Nervous System and Cardiovascular Data Using Computer Methods held in Washington, D.C., Oct. 29-30, 1964, have been brought together in a single publication. Sponsored by the National Aeronautics and Space Administration, the symposium received 27 papers devoted to the study of the behavior of the brain and cardiovascular systems, with particular regard for the use of mathematical techniques for analyzing the data. The publication contains many photographs, graphs, and charts illustrating the use of computer methods for biological analyses.

COMPUTER PROGRAMS ANALYZE CELL VOLUME DISTRIBUTIONS

(Order Stock No. LA-3440 Computer Analysis of Cell Volume Distributions, HC $3.00/MF $0.50.)

The use of electronic particle counters to measure volume distributions of cells has resulted in computer programs developed by the Los Alamos Scientific Laboratory to satisfy the need for an accurate method of analyzing the volume spectra. Los Alamos observes that the study of changes in volume distributions of various cells under different experimental conditions requires a precise knowledge of the parameters of the distribution. Some cell volume distributions can be fitted quite accurately with normal, log-normal, or skewed-normal functions. Since such calculations require computer techniques, Los Alamos had to develop programs to perform them. The parameters calculated are the area (number of cells), standard deviation, mean, and, if applicable, coefficient of skewness.

BLOOD-COMPATIBLE POLYMERIC MATERIALS DEVELOPED

(Order Stock No. PB-168 861 Development of Blood-Compatible Polymeric Materials, HC $3.00/MF $0.75.)

A number of polymers have been rendered nonthrombogenic by the surface chemical attachment of heparin, according to a report prepared for the National Heart Institute by Battelle. This surface heparinization has been effected by chemically bonding a quaternary ammonium salt to the polymer surfaces. Heparin forms an insoluble complex with these quaternary salts and thus is bound to the surface. Success has been achieved with a rigid polymer (polystyrene), a semirigid polymer (polyethylene), and an elastomeric material (butadiene/vinyl pyridine copolymer). Two pathways leading to surface heparinization of polystyrene have been developed. One involves chloromethylation followed by amination with dimethyl aniline or pyridine. The other grafts 4-vinylpyridine onto polystyrene and then alkylation is prescribed with methyl iodide to form a quaternary ammonium group. Two methods have also been developed for attaching quaternary ammonium groups to polyethylene. One involves radiation grafting of styrene to the surface, chloromethylation, and amination by pyridine. The other grafts 4-vinylpyridine to polyethylene which is then alkylated with methyl iodide, resulting in a quaternary salt.

OAK RIDGE BUILDS NEW WHOLE-BODY COUNTER

(Order Stock No. ORINS-51 The Design of a Low-Background Whole-Body Counting Facility, HC $3.00/MF $0.50.)

The Oak Ridge Institute of Nuclear Studies has built a new low-level whole-body counter. The facility is the latest in a series of whole-body counters built by ORINS with the objective of providing a series of instruments that will allow clinical whole-body counting studies over a continuous range of activities from therapeutic doses down to natural body background levels. An illustrated report of the work gives complete design and construction information and describes operation of the facility and its performance.

Chemicals

CHEMISTS ALERTED TO UTILITY OF WISWESSER LINE-NOTATION

(Order Stock No. AD-624 525 The Wiswesser Line-Notation: An Introduction, HC $2.00/MF $0.50.)

A report on the Wiswesser line-notation prepared by the Army Chemical Research and Development Laboratories alerts the chemist to its wide utility and offers him basic instructions for encoding the majority of the compound types to be found in an elementary organic text. Specificially, this system of notation shows promise as a remedy for many indexing ills and as an information retrieval instrument of great versatility. WLN is inherently better suited for confident, rapid, detailed retrieval of structural information by either humans or machines. With it one can represent a three-dimensional structure with a concise, unique, unambiguous one-dimensional notation. There is only one notation for a given compound and only one place to look for it in an index. Since the notation is a string of individual symbols which represent functional groups, molecular fragments, bond types, or structural features, it is possible to tailor indexing techniques for very general searching. For example, using a permuted notation index, searches for all esters, acids, or pyridine derivatives can be accomplished in a matter of minutes.

Electrical

WEATHER PATTERNS CORRELATED WITH ELECTRIC POWER LOAD

(Order Stock No. PB-169 380 Weather and Load Pattern Correlation Study to Develop a Method of Short-Range Load Forecasting Based on Weather and Load Data, HC $3.00/MF $0.75.)

Weather patterns and electric power system load characteristics have been examined with a digital computer for linear correlation by the U.S. Bureau of Reclamation. Using weather data from 7 stations of the Missouri River Basin power system, the investigators studied daily load characteristics, including minimum load, noon peak, evening peak, and average load. The weather elements considered include temperature, wind velocity, cloud cover, and precipitation. Loads of small areas show a higher degree of correlation with weather than do large area loads, where diversity in load and weather degrade correlation. Correlations exist between average daily

load versus average daily temperature wind velocity, and cloud cover. Correlations between load and precipitation, however, are insignificant. The investigators developed a formula that can be used in short range (1 to 30 days) forecasting of load. The formula is based on daily, weekly, or monthly weather prediction and on factoring a computed small local area typical load in each of three major areas with essentially uniform weather.

BRUSHLESS D-C TORQUE MOTOR OPERATES IN VACUUM

(Order Stock No. N66-16089 Final Report for a Brushless DC Torque Motor, HC $4.00/MF $1.00.)

A brushless d-c torque motor with performance characteristics similar to those of a conventional permanent-magnet d-c torque motor has been developed by Westinghouse Electric Corp. The motor is for operation in a vacuum at 1×10^{-9} mm Hg for 1 year in an ambient range of -10 to 70°C. It can also withstand a 50 g, 2 msec shock and 5 minutes of random vibration from 20 to 2000 cycles per second at 15 g's rms in each of three mutually perpendicular directions. The commutator is sufficiently versatile to permit shaft position control and speed control using both excitation level and pulse modulation systems. The assembly is comprised of three systems — a permanent-magnet motor, a rotor-position-sensing apparatus, and an electronic control system. The permanent-magnet motor consists of a rotating permanent-magnet field and a stationary armature. The position of the rotating field magnet in relation to its armature field is sensed by the rotor-position-sensing device. This apparatus transmits the position information to the electronic control. The control uses transistor switches to change the position of the armature field to maintain torque as the position of the rotating field changes. Altogether the assembly weighs 3.4 pounds and has a no-load speed of about 30 rpm with 3 volts at the armature terminals.

Information Technology

SCIENCE AND TECHNOLOGY SERIALS DATA PROGRAM FEASIBLE

(Order Stock No. PB-169 405 A Serials Data Program for Science and Technology — Results of a Feasibility Study, HC $5.00/MF $1.00.)

It is feasible to establish a continuing National inventory of the world's scientific and technical serials, according to a study made by Information Dynamics Corporation. Major principles of program feasibility involve the file dependency of the program, the paramount significance of achieving basic file control, and the organization of the data to be collected. The study covers possible procedural strategies for program operation along with major methodological considerations and system requirements. It describes a suggested procedural strategy and gives estimates to establish and operate a serials data program. Information Dynamics says no serious obstacles or problems are foreseen, and the most feasible approach is via a controlled well-planned program of file development which balances the program objectives with the real operational limitations and demands that exist. The establishment of the program would represent a fundamental and highly responsive step toward the achievement of improved use of the scientific and technical literature.

Management Control, Decision Systems

RAND EXPLORES LOGISTICS CONCEPTS

(Order Stock No. AD-629 131 Logistics Systems Capacity, HC $2.00/MF $0.50.)

RAND Corporation has examined some of the fundamental concepts useful in measuring the performance of logistics systems and has explored some of the implications to management. This is done in terms of the concept of logistics system capacity, which is related to the concept of industrial capacity. RAND says one may distinguish three general categories of industrial capacity concepts: Engineering, Statistical, and Economic. Their study examines several widely used concepts of industrial capacity in each category as follows: Engineering (rated, theoretical, practical); Statistical (normal, maximum normal, peak); and Economic (minimum average total cost, marginal cost, normal sales expectancy). As defined in the RAND study, logistics systems capacity depends on four fundamental parameters: (1) Production Rate — the average output of the system; (2) Throughput Time — the average time required per unit output to process through the system; (3) Utilization Rate — the average fraction of available production time during which productive facilities are actively processing units through the system; and (4) Waiting Rate — the average fraction of throughput time during which units are not actively being processed by the system. The parameters are useful as inputs to evaluating the effectiveness of a system, plant or work center; planning production, including the procurement and allocation of production equipment and personnel; and cost/effectiveness analysis.

TECHNOLOGY-DEPENDENT ORGANIZATIONS AND RESEARCH

(Order Stock No. AD-628 747 The Fundamental Research Activity in a Technology-Dependent Organization, HC $4.00/MF $0.75.)

Fundamental research activities within the context of larger technology-dependent organizations in private industry and in the Federal Government are discussed in six papers presented at the American University Tenth Institute on Research Administration, April 26-29, 1965, in Washington, D.C. The papers, by scientists and research managers, have been published by the Air Force Office of Scientific Research so they can be of timely use to a wider audience. They discuss the organization of science in a technology-oriented corporation, scientists' expectations, incentives and career patterns, and work unit effectiveness within a Federal Government agency. One paper describes how one research organization, the Air Force Office of Scientific Research, goes about using the efforts and output of the extramural science-oriented community, in universities and elsewhere, to the benefit of the Air Force's overall mission. Another discusses managerial principles for planning research for industry and government with emphasis on the role of research in newly developing countries.

SYSTEMS ANALYSIS TECHNIQUES OUTLINED BY RAND

(Order Stock No. AD-629 564 Systems Analysis Techniques for Planning-Programming-Budgeting, HC $2.00/MF $0.50.)

Systems analysis techniques for planning, programming, and budgeting are outlined in a RAND Corporation monograph. RAND describes a systems analysis as a

study designed to help a decisionmaker identify a preferred choice among possible alternatives. It is characterized by a systematic and rational approach, with assumptions made explicity, objectives and criteria clearly defined, and alternative courses of action compared in the light of their possible consequences. An effort is made to use quantitative methods, but computers are not essential.

Metals, Non-Ferrous and Alloys

1965 AEC BASIC RESEARCH PROGRAMS SUMMARIZED

(Order Stock No. TID-4005 (Pt. 1, 9th Ed.) Summaries of the USAEC Basic Research Programs in Metallurgy, Solid State Physics, and Ceramics (Fiscal Year 1965), HC $5.00/MF $2.25.)

A 464-page report of the 1965 USAEC basic research programs in metallurgy, solid state physics, and ceramics summarizes work on materials, properties, and process, structure of materials, radiation damage, materials preparation and characterization, crystal physics, and energetic particle interaction. The major objective of the AEC metallurgy and materials program is to advance scientific understanding of the structure and properties of matter in the condensed state in terms of how structure and properties interrelate, what factors control them, and how they originate in the fundamental laws of nature.

NICKEL-BERYLLIUM ALLOY VIES FOR CRYOGENICS USE

(Order Stock No. N66-14757 Effect of Cold Reduction and Thermal Treatment on Tensile Properties of a Nickel-2 Percent Beryllium Alloy at Cryogenic Temperatures, HC $1.00/MF $0.50.)

A nickel-2 percent beryllium alloy subjected to cold reduction and thermal treatment by NASA's Lewis Research Center has high strength, toughness, and elongation at cryogenic temperatures in a sheet thickness of 0.020 inch and in the direction of rolling. For material solution-treated and aged, yield and notch strengths are 204 and 170 ksi, and average elongation is 16 percent at -423°F. For this alloy cold-reduced 60 percent and aged, -423°F yield and notch strengths are 267 and 219 ksi, and average elongation is 19 percent. NASA therefore concludes the material could be competitive with others currently used for cryogenic applications. The solution-treated and aged condition and the 60 percent cold-reduced condition (with and without aging) appear the most useful for cryogenic service.

Nuclear Technology

TECHNIQUES FOR NEUTRON ACTIVATION ANALYSIS IMPROVED

(Order Stock No. NYO-10175 Research in Activation Analysis, HC $4.00/MF $1.00.)

Union Carbide has developed many improved radiochemical procedures and neutron activation analysis techniques. Among other things, the firm has developed a rapid activation analysis method for the simultaneous determination of microgram amounts of tantalum and niobium in various sample materials. Another rapid method determines

microgram amounts of magnesium in ores and blood serum. Radiochemical procedures have been used to separate sequentially the multiple components of a radioactive mixture. The results show that as many as 12 different neutron-induced radioactive species can be separated from a single neutron-activated sample in just a few hours.

Quality Control Standards, Specifications

A GUIDE TO CLEAN ASSEMBLY OF PRECISION COMPONENTS

(Order Stock No. SC-DC-66-1118 Clean Assembly Practices Guide, HC $3.00/MF $0.75.)

Sandia Corporation has prepared a practical guide to clean assembly practices that relate to manufacturing processes for high reliability precision components. The guide points out recurrent areas of process difficulties relating to cleaning, and suggests controls to minimize contamination. It describes the effective use of ultrasonic cleaners, noncavitating cleaning techniques, solvents, contamination potential during manufacturing processes, and training of personnel. "Clean assembly practices are not the exclusive responsibility of the personnel who staff a component assembly area," says the Sandia guide. "Clean practices must be anticipated by design engineers, materials and process specialists, layout engineers, and fabrication personnel, so that cleaning operations are facilitated and contaminants are avoided. However, the most important application of clean assembly practices is in the assembly area."

FORMULA AND TABLES DEVISED FOR SAMPLING PRODUCTION RUNS

(Order Stock No. ORNL-3909 The Minimum Significant Number of Successes in a Binomial Sample, HC $3.00/MF $0.75.)

Union Carbide has developed tables based on a formula for sampling in the quality control of manufactured products. The tables give the smallest number of successes or failures in a run of independent trials or members of the samples for determining the basis of rejection of productions runs. For example, let us say a manufacturer of electronic tubes will be satisfied with his production process if the proportion of defective tubes is less than or equal to 0.08. If the proportion exceeds this, he will be forced to withdraw his product from the market. To maintain some control over his daily shipments, he institutes the following inspection rule: At the end of each day, 100 tubes are selected at random for inspection. If a certain number or more of these are defective, he will conclude that the proportion of defectives is greater than 0.08, and he will not permit any of the tubes produced that day to be marketed. Because of the loss which may be incurred, he does not wish to be wrong more than 1 percent of the time in making this decision. Use of the tables will then tell the minimum number of defectives which must be observed before a day's production is rejected.

FATIGUE LIFE OF BOLTS DEPENDS ON NUT DESIGN

(Order Stock No. AD-446 247 The Effect of Nut Design on the Fatigue Life of Internal Wrenching Bolts, recently released, in HC only, $2.00.)

A wide range of fatigue life may be obtained with internal wrenching bolts,

depending upon the use of different type nuts. A study by the Naval Air Engineering Center has quantitatively determined the effects of individual design factors, such as height of nut, strength of nut, use of lubricants, angularity, and tightening torque. "By far the most important general conclusion," says the Navy study, "is that extreme variation in fatigue life may be obtained with the use of differently designed nuts, or even with the use of the same type nut having different tolerances. The fatigue performance of a bolt, regardless of how superior the bolt is as separate entity, is dependent on the fatigue susceptibility influence the nut has upon the bolt. Further, it may be concluded that greatly extended improvement in fatigue life may be achieved if an elaboration of design is permitted, its unavoidable consequent complexities of manufacture are acceptable, and the cost is not prohibitive." The Navy study recommends that "the Military Services should take the initiative in developing a Military Standard for fatigue testing of aeronautical fasteners to replace NAS 1069, which is now obsolete. Every effort should be made by responsible authorities to create an awareness of the complexities of fastener design and the very interdependent considerations involved, and to instill a fastener consciousness starting from the drawing board, through the gamut of design and development to the production shop floor." These recommendations have resulted in a combined Federal-industry group that is charged with developing standards and tests for fasteners.

Sanitary Engineering

WATER RESOURCES RESEARCH CATALOG BACK IN PRINT

(Order Stock No. PB-169 522 Water Resources Research Catalog, Vol. I, Part I, Federally Supported Research in Progress, HC $7.50/MF $2.00.)

The Office of Water Resources catalog of research in progress on projects supported by Federal funds, the only available source of such published information, has been reprinted by the Clearinghouse. The OWRR catalog was first published in February 1965 using as source material the Notices of Research Projects submitted by the Federal agencies to the Smithsonian Institution's Science Information Exchange. Over 1500 project summaries are included in eight chapters, listed alphabetically therein by states and cities. Chapter headings are: Nature of Water, Water Cycle, Water and Land Management, Development and Control, Qualitative Aspects, Re-use and Separation, Economic and Institutional Aspects, and Engineering Works. In addition to these categories of current water resources research, the catalog contains indexes for corporate author, subject, supporting agency and abbreviation code, and principal investigator.

RECLAIMED WASTE WATER MAKES MAN-MADE LAKES

(Order Stock No. PB-169 370 The Santee Recreation Project, Santee, California, HC $3.00/MF $0.75.)

For the last four years two recreational lakes at Santee, Calif., have been supplied with a reclaimed waste water developed from the community's secondary plant. According to a U.S. Public Health Service report, no health hazards have been demonstrated for the present recreational uses of boating and fishing. Their report also says that health hazards of more intimate contact, such as swimming in the re-

claimed water, cannot be demonstrated by the viral or other findings. Furthermore, the treatment — activated sludge, oxidation pond, and intermittent sand filtration — has met the nutrient requirements for a balanced chain of producers and consumers that have successfully supported seven types of fish. The report notes that the lakes were deliberately planned to use the Santee community's reclaimed sewage effluent. A seven-agency cooperative study evaluated the fate of virus along with total and fecal coliform and fecal streptococci through the conventional secondary treatment process, the tertiary processes, and the recreational lakes.

Transportation (Land, Sea, Air, Space)

AUTOMATION IN AIR TRAFFIC CONTROL

(Order Stock No. PB-169 032 Third International Aviation R and D Symposium on Automation in Air Traffic Control, Session I, HC $3.00/MF $0.75; PB-169 033, same title, Session II, HC $3.00/MF $0.75; PB-169 034, same title, Session III, HC $3.00/MF $0.75.)

The three-volume proceedings of the Third International Aviation R and D Symposium on Automation in Air Traffic Control are now available from the Clearinghouse. Sponsored by the Federal Aviation Agency in Nov. 1965, the conference received 16 domestic and foreign papers reviewing worldwide efforts at automation in air traffic control. Most remarkable is the fact that every major country is involved in such research and is using the basic concept of automation, which will eventually bring swift computer production of reports on flight strips, flight following, radar tracking, as well as altitude and position. In the U.S., the National Air Space Systems plan is in stage A, consisting of work toward a computerized air traffic control center at Jacksonville, Fla., as an initial test site. Target date for implementing stage A prototype equipment is 1967.

TRANSPORTATION NEEDS OVER NEXT 25 YEARS PROJECTED

(Order Stock No. N64-25006 Future U.S. Transportation Needs, HC $3.50/MF $1.50.)

The National Aeronautics and Space Administration has reprinted its 300-page 1963 publication on U.S. transportation needs over the next 25 years. The study's basic aim is to assist in evaluating the type of air vehicles needed in the future, but it will also be of considerable value to those concerned with other forms of transportation. The Nation's transportation needs are considered in three separate areas of demand: intra-urban, domestic intercity, and international. Although future transportation needs involve the movement of both people and merchandise in these areas, the study is devoted almost exclusively to an analysis of the transportation needs of people. It first identifies those factors which account for transportation demand. These factors — economic, geographic, sociological, political, and technological in nature — generate or account for the overall demand for transportation services needed to expedite the flow of the Nation's people and its goods. The study then relates such factors to various characteristics of demand, including such measurements as volume, density and length of journey or haul, class of traffic (passenger or property), user-category (business or personal travel), and value of service. The basic factors which account for transportation demand are then projected to the future.

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CURRENT research & development PROJECTS

03. Astronomy and Astrophysics

GPF 581 3 FIELD 3A, 8D, 7B

UNIV OF CAL-LA JOLLA, GRADUATE SCHOOL, CHEMISTRY, CALIFORNIA

THE DISTRIBUTION AND ORIGIN OF THE ELEMENTS AND THEIR ISOTOPES IN NATURE

H. C. UREY, K. MARTI, C. B. REES

AT(11-1)3443
8/65- 8/66

AEC-DIVISION OF PHYSICAL RES

GQF 259235 FIELD 3B, 3A, 9+, 9A

KNIGHT E CORP, MASSACHUSETTS

DESIGN + DEVELOPMENT OF RADIO ASTRONOMY INTERFEROMETER

. NONE
AF-19-628-04799
/65- /

DOD-AIR FORCE

GQF 259391 FIELD 3A, 3B,20M, 5A

JOHNS HOPKINS UNIV, GRADUATE SCHOOL, PHYSICS, MARYLAND

DETERMINE SPECTRAL COMPONENTS OF THERMAL EMISSION OF VENUS

J. D. STRONG
AF-19-628-04334
/65- /

DOD-AIR FORCE

GQF 259408 1 FIELD 3A, 3B,20J,20F

OBSERVATORY DE PARIS, FRANCE

RESEARCH DIRECTED TOWARDS THE INVESTIGATION OF INHOMOGENEITIES IN THE SOLAR ATMOSPHERE

R. MICHARD
AF-61-052-00785
/65- /

DOD-AIR FORCE

GQF 259988 1 FIELD 3A, 3B, 5A,20F

MASS INST OF TECHNOL, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

DEVELOPMENT OF AN IMPROVED PROCESS FOR OPTICAL GRATING RULING

G. R. HARRISON
AF-19-628-03994
/65- /

DOD-AIR FORCE

GQF 260443 FIELD 3A, 3B,20J, 5A

CAL INST OF TECHNOLOGY, GRADUATE SCHOOL, PHYSICS, CALIFORNIA

STUDIES OF INHOMOGENETIES IN LINES OF THE SOLAR SPECTRUM
H. ZIRIN

AF-19-628-05082
/65- /

DOD-AIR FORCE

04. Atmospheric Sciences

GQF 259424 FIELD 12A, 5C, 8E

PENNSYLVANIA ST UNIV, SCHOOL OF MINERAL IND, METEOROLOGY, PENNSYLVANIA

PREPARE ANALYSIS OF CLOUD + PRESSURE FIELD FOR TROPICAL CYCLONES + STUDY CLOUD MOISTURE + RADIATION

E. F. DANIELSON
AF-19-628-04762
/65- /

DOD-AIR FORCE

GQF 259430 FIELD 4A, 8+, 9+, 5A

NORTHEASTERN UNIV, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

STUDY OF RADAR ECHOES FROM CLEAR ATMOSPHERE + DEVELOPMENT OF ADVANCED RADAR TECHNIQUES

L. DOLANSKY
AF-19-628-04956
/65- /

DOD-AIR FORCE

GQF 259474 4 FIELD 12A, 5C, 8E

GERMAN WEATHER SERVICE, GERMANY

EXPERIMENTAL + THEORETICAL STUDIES ON NUMERICAL WEA PREDICTION MODELS USING PRIMITIVE FCST EQUATIONS

H. HINKELMANN
AF-61-052-00373
/65- /

DOD-AIR FORCE

GQF 259654 1 FIELD 4A,20F

UNIV OF MUNICH, GERMANY

STUDY THE EMISSION SPECTRUM OF THE EARTHS ATMOSPHERE WITH PARTICULAR REGARD TO EFFECTS OF DUST AND HAZE

F. MOELLER

AF-61-052-00778
/65- /

DOD-AIR FORCE

GQF 259793 1 FIELD 4A, 8+, 9+

STANFORD UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

INVESTIGATION OF IONOSPHERIC PROPAGATION BY OBLIQUE INCIDENCE SOUNDING EXPERIMENTS

O. G. VILLARD

AF-19-628-04004
/65- /

DOD-AIR FORCE

GQF 259807 FIELD 4A, 8+, 9+

RESEARCH IN INOSPHERIC STUDIES OPERATION OF TRANSMISSION SITE FOR GLOBAL OBLIQUE STUDIES

K. FOLKESTAD

AF-61-052-00835
/65- /

DOD-AIR FORCE

GQF 260742

USN, BUR NAV WEAP, DIST OF COLUMBIA

FUND TRANSFER FOR MODIFICATION + MAINTENANCE OF WALLOPS STATION RADAR FACILITY FOR CLEAR AIR TURBULENCE RESEARCH

NONE
/65- /

DOD-AIR FORCE

GSP 1247 2 FIELD 4A,20A

COLUMBIA UNIVERSITY, GRADUATE SCHOOL, GEOLOGY, NEW YORK

THEORY OF ATMOSPHERIC WAVE PROPAGATION

R. L. PFEFFER, W. L. DONN, M. EWING

NSF-GP-2371
12/65-12/66

NSF-PHYSICAL SCIENCES DIVISION

GUW 342 FIELD 8H,20F,20A

UNIVERSITY OF IDAHO, GRADUATE SCHOOL, WATER RESOURCES, IDAHO

PHYSICAL STATE PROPERTIES OF PRECIPITATION

O. A. MCKEAN, G. *. MCKEAN, J. C. READ

INT-WR-A-008-1DA
/66- /

INTERIOR-OFFICE OF WATER RESOURCES

05. Behavioral and Social Sciences

GSP 2366 FIELD 5C

UNIV OF CAL-BERKELEY, SCHOOL OF ENGINEERING, INDUSTRIAL ENGINEERING, CALIFORNIA

OPERATIONS RESEARCH

G. B. DANTZIG, R. E. BARLOW, D. GALE
W. S. JEWELL, R. M. OLIVER
R. W. SHEPHARD, R. VANSLYKE

NSF-GP-4593
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

06. Biological and Medical Sciences

GSB 1491 1 FIELD 7C, 7D

COE COLLEGE, UNDERGRADUATE SCHOOL, CHEMISTRY, IOWA

REACTION OF CHLOROPHYLL AND PYROCHLOROPHYLL WITH AMINES

F. C. PENNINGTON

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12/65-12/66

NSF-BIOLOGICAL + MEDICAL SCIENCES DIVISI

214-537 O - 66 - 8

GSB 4230 FIELD 7C, 7A, 7D

HARVARD UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, MASSACHUSETTS

THE MECHANISM OF TERPENE BIOSYNTHESIS

K. E. BLOCH

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9/65- 9/66

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07. Chemistry

GPF 15 3 FIELD 7D,20J,20L, 7B

MASS INST OF TECHNOL, GRADUATE SCHOOL, CHEMISTRY, MASSACHUSETTS

THERMODYNAMIC, SPECTRAL AND STRUCTURAL STUDIES OF COMPLEX IONS

F. A. COTTON

AT(30-1)1965
9/65- 9/66

AEC-DIVISION OF PHYSICAL RES

GPF 17 4 FIELD 18A,20H, 7D, 7B

UNIV OF NOTRE DAME, GRADUATE SCHOOL, PHYSICS, INDIANA

A PROGRAM IN NUCLEAR SPECTROSCOPY

J. W. MIHELICH, R. BELT, P. BLICHERTTOFT
D. BUSS, B. S. FUNK, J. JAKLEVIC
P. KENEALY

AT(11-1)498
12/65-11/66

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GPF 22 3 FIELD 7C,20J,20L, 7B

RUTGERS THE STATE UNIV, GRADUATE SCHOOL, CHEMISTRY, NEW JERSEY

STUDIES IN NUCLEAR AND RADIO CHEMISTRY

R. H. HERBER, C. GALLINA, G. I. PARISI
H. SANO, H. A. STOECKLER

AT-30-1-2472
9/65- 9/66

AEC-DIVISION OF PHYSICAL RES

GPF 82 3 FIELD 7C, 7D, 7A,12A

UNIVERSITY OF ARKANSAS, GRADUATE SCHOOL, CHEMISTRY, ARKANSAS

PRECIPITATION FROM HOMOGENEOUS SOLUTIONS OF MIXED SOLVENTS

L. C. HOWICK

AT(40-1)2954
1/66-12/66

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GPF 428 3 FIELD 7C, 7D, 7A

WASHINGTON STATE UNIV, GRADUATE SCHOOL, CHEMISTRY, WASHINGTON

OPTICAL STUDY OF EQUILIBRIUM IN ION-EXCHANGE SYSTEMS WITH AQUEOUS ELECTROLYTES

D. H. FREEMAN, A. S. AIYAR, C. HANSEN

AT-45-1-1544
5/65- 9/65

AEC-DIVISION OF PHYSICAL RES

GPF 457 3 FIELD 7C, 7D, 7A,20J

LOUISIANA ST UNIV A+M, GRADUATE SCHOOL, CHEMISTRY, LOUISIANA

A QUANTITATIVE STUDY OF STEREOSELECTIVE REACTIONS

J. H. STOCKER

AT-40-1-2833
9/65- 8/66

AEC-DIVISION OF PHYSICAL RES

GPF 480 2 FIELD 7C, 7D, 7A,20J

UNIV OF SOUTHERN CALIF, GRADUATE SCHOOL, CHEMISTRY, CALIFORNIA

PHOTO CHEMISTRY OF COMPLEX IONS

A. W. ADAMSON, P. FLEISCHAUER
R. LINDHOLM, M. MAH, S. PENKETT

AT-11-1-113-10
8/65- 7/66

AEC-DIVISION OF PHYSICAL RES

GPF 491 3 FIELD 7C, 7D,20M, 7B

PURDUE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, INDIANA

GAS CHROMATOGRAPHY, FOAM FRACTIONATION, AND OTHER SEPARATION METHODS

L. B. ROGERS, M. F. BURKE, B. T. GURAN
R. E. MAJORS, A. K. MORELAND
P. NEDDERMEYER, J. E. OBERHOLTZER

AT-11-1-1222
11/65-10/66

AEC-DIVISION OF PHYSICAL RES

GPF 533 3 FIELD 7C, 7D, 7A, 7B

NEW YORK UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

STUDIES IN FUSED SALTS

B. R. SUNDHEIM, E. LEVY

AT-30-1-1938
6/65- 6/66

AEC-DIVISION OF PHYSICAL RES

GPF 720 3 FIELD 20J,20F,20L, 7B

JOHNS HOPKINS UNIV, GRADUATE SCHOOL, PHYSICS, MARYLAND

ABSORPTION AND FLUORESCENCE SPECTRA OF URANIUM SALTS AND OTHER SOLIDS - SPECTRA OF MOLECULES CONTAINING TRITIUM, ETC.

H. M. CROSSWHITE, J. BECHER, E. DORMAN
L. MADANSKY

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GPF 721 4 FIELD 7D, 7A, 7B

PRINCETON UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, NEW JERSEY

HETEROGENEOUS CATALYSIS - SYNTHESIS, CHARACTERIZATION AND INVESTIGATION OF REACTION KINETICS

J. TURKEVICH, Y. FUJITA, J. KARRA

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GPF 738 3 FIELD 7A, 7D, 7B

STANFORD UNIVERSITY, SCHOOL OF EARTH SC, MINERAL ENGINEERING, CALIFORNIA

INORGANIC OXIDES IN AQUEOUS SYSTEMS - THE ZERO POINT OF CHARGE

G. A. PARKS, P. C. HANKINSON, R. W. LUCE

AT(04-3)326-3
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GPF 775 4 FIELD 7A, 7D,20M,20D

UNIV OF MINNESOTA, GRADUATE SCHOOL, METALLURGICAL ENGIN, MINNESOTA

DIFFUSION STUDIES IN LIQUID METALS
R. A. SWALIN, M. DAEG, Y. P. GUPTA
M. IWATA, P. LIEN

AT-11-1-841
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GPF 780 3 FIELD 7C, 7D, 7A, 7B

UNIV OF CAL-L. A., GRADUATE SCHOOL, CHEMISTRY, CALIFORNIA

COMPLEX ION CHEMISTRY

C. S. GARNER, E. J. BOUNSALL, D. A. HOUSE
R. I. LIN, J. M. VEIGEL
AT(11-1134-12
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AEC-DIVISION OF PHYSICAL RES

GPF 783 1 FIELD 7D, 7A, 7B

OHIO STATE UNIVERSITY, SCHOOL OF ENGINEERING, METALLURGICAL ENGIN, OHIO

AN INVESTIGATION OF MIXED CONDUCTION IN SOLID ELECTROLYTES

R. A. RAPP
AT(11-1)1440
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AEC-DIVISION OF PHYSICAL RES

GQF 284662 2 FIELD 7C, 7D,20M,20J

UNIV OF HEIDELBERG, GERMANY

RESEARCH ON SULFUR-PHOSPHORUS-NITROGEN POLYMERS

M. BECKEGOEHRING
AF-61-052-00682
/65- /

DOD-AIR FORCE

GQF 284675 2 FIELD 7C, 7D,20M

POLYTECH INST BROOKLYN, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

MECHANISM OF COMPLEX POLYMER FORMATION

C. G. OVERBERGER
AF-33-657-10889
/65- /

DOD-AIR FORCE

GQF 284680 5 FIELD 7C, 7D

UNIV OF VIENNA, AUSTRIA

ORGANIC CHEMISTRY OF FERROCENE

K. SCHLOGL

AF-61-052-00383
/65- /

DOD-AIR FORCE

GQF 284689 3 FIELD 7C, 7D, 7A

GEORGE WASHINGTON UNIV, SCHOOL OF ENGINEERING, DIST OF COLUMBIA

THERMAL DEGRADATION OF POLYMERS

N. GRASSIE
AF-EOAR-0078-62
/65- /

DOD-AIR FORCE

GDF 284847 1 FIELD 7C, 7D,20J

UNIV OF HOUSTON, GRADUATE SCHOOL, CHEMISTRY, TEXAS

THERMO AND PHOTOCHROMISM

R. S. BECKER

AF-33-615-01733
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GSB 1399 1 FIELD 7D, 7B

UNIV OF CAL-SANTA BARB, UNDERGRADUATE SCHOOL, CHEMISTRY, CALIFORNIA

INVESTIGATIONS OF ACID BASE CATALYSIS IN WATER ICE

T. C. BRUICE

NSF-GB-3049
12/65-12/66

NSF-BIOLOGICAL + MEDICAL SCIENCES DIVISI

GSB 2267 1 FIELD 7C,20J

CASE INST OF TECHNOL, SCHOOL OF ENGINEERING, ENGINEERING, OHIO

MORPHOLOGY OF CRYSTALLINE POLY

P. H. GEIL, J. J. BUNGS

NSF-GB-3224
12/65-12/66

NSF-BIOLOGICAL + MEDICAL SCIENCES DIVISI

GSE 665 FIELD 7C, 7D, 7A,20M

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, CHEMICAL + METAL ENGIN, MICHIGAN

SPECTROGRAPHIC STUDIES AT EXTREMELY HIGH TEMPERATURES

R. H. KADLEC, S. W. CHURCHILL

NSF-GK-632
10/65- 9/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 774 FIELD 7D, 7A

UNIV OF PENNSYLVANIA, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, PENNSYLVANIA

APPLICATION OF THE ROTATING DISK TO LIQUID-PHASE REACTION SYSTEMS

M. LITT

NSF-GK-452
6/65- 6/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 775 FIELD 7A, 7D

UNIV OF PITTSBURGH, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, PENNSYLVANIA

LIQUID PHASE TURBULENT DIFFUSION AND REACTION

H. E. HOELSCHER

NSF-GK-464
7/65- 7/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 805 FIELD 7D

UNIV OF WISCONSIN, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, WISCONSIN

THE DESIGN OF LARGE PROCESSING SYSTEMS

O. F. RUDD

NSF-GK-434
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NSF-ENGINEERING SCIENCES DIVISION

GSE 808 FIELD 7C,20J

CASE INST OF TECHNOL, SCHOOL OF ENGINEERING, ENGINEERING, OHIO

STRUCTURE OF THE FOLDED POLYMER CHAIN

J. L. KOENIG

NSF-GK-436
6/65- 6/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 810 FIELD 7C, 7A, 7D, 7B

STATE UNIV N Y BUFFALO, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, NEW YORK

INTERFACIAL TENSION BETWEEN WATER AND ORGANIC LIQUIDS

R. J. GOOD, D. R. BRUTVAN

NSF-GK-384
6/65- 6/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 813 FIELD 7D

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, CHEMICAL + METAL ENGIN, MICHIGAN

STUDIES IN THE FIELD OF HETEROGENEOUS CATALYSIS

G. PARRAVANO

NSF-GK-383
5/65- 5/66

NSF-ENGINEERING SCIENCES DIVISION

GSP 1993 1 FIELD 20J, 5A,18A

UTAH ST UNIV OF AGRIC, GRADUATE SCHOOL, PHYSICS, UTAH

GAMMA AND X-RAY SPECTROSCOPY

J. W. DUMOND, W. F. EDWARDS
J. J. MERRILL, J. K. WOOD

NSF-GP-3851
12/65-12/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2109 FIELD 7C, 7A, 7D

UNIV OF CAL-LA JOLLA, GRADUATE SCHOOL, OCEANOGRAPHY, CALIFORNIA

EFFECT OF PRESSURE ON CONDUCTIVITY OF SOLUTIONS

F. H. FISHER

NSF-GP-4748
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2160 FIELD 7C, 7D

GASEOUS DIFFUSION COEFFICIENTS AS A FUNCTION OF TEMPERATURE

J. W. BEATTY

NSF-GP-4320
4/65- 4/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2162 FIELD 7C, 7A

UNIV OF MINNESOTA, GRADUATE SCHOOL, CHEMISTRY, MINNESOTA

CARBONIUM ION REACTION RATES

A. E. HILL

NSF-GP-4394
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2191 FIELD 7C, 7B

POLYTECH INST BROOKLYN, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

NEW POLYVALENT ORGANOIODINES
M. F. BERINGER

NSF-GP-4425
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2194 FIELD 7D,20J, 7B

UNIVERSITY OF ARKANSAS, GRADUATE SCHOOL, CHEMISTRY, ARKANSAS

STEREOCHEMISTRY OF COORDINATED SELENIUM

W. A. CORDES
NSF-GP-4366
5/65- 5/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2197 FIELD 7C, 7A

PURDUE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, INDIANA

MASS SPECTROSCOPY - UNIMOLECULAR ION DECOMPOSITIONS

F. W. MCLAFFERTY
NSF-GP-4335
4/65- 4/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2198 FIELD 7C, 7D

UNIV OF NOTRE DAME, GRADUATE SCHOOL, CHEMISTRY, INDIANA

CARBONYL OXYGEN INTERACTIONS WITH INCIPIENT CARBONIUM IONS

D. J. PASTO
NSF-GP-4479
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2199 FIELD 7C

UNIV OF CAL-L. A., GRADUATE SCHOOL, CHEMISTRY, CALIFORNIA

PARACYCLOPHANE CHEMISTRY

D. J. CRAM
NSF-GP-4395
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2202 FIELD 7C,20J

BROWN UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, RHODE ISLAND

UNUSUAL CHEMICAL RING STRUCTURES

J. F. BURNETT
NSF-GP-4426
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2204 FIELD 7D

VANDERBILT UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, TENNESSEE

ELECTROPHILIC REACTIONS

D. E. PEARSON

NSF-GP-4414
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2207 FIELD 7C

ILLINOIS INST OF TECH, GRADUATE SCHOOL, CHEMISTRY, ILLINOIS

MEDIUM-SIZED CARBOCYCLES

P. E. FANTA

NSF-GP-4416
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2239 FIELD 7D, 7A, 7B

WORCESTER POLY INST, SCHOOL OF ENGINEERING, CHEMISTRY + CHEM ENGIN, MASSACHUSETTS

METAL-HYDROXY COMPLEX IONS IN SOLUTIONS

R. C. PLUMB

NSF-GP-4369
5/65- 5/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2242 FIELD 7C, 7D,20J

WHITMAN COLLEGE, UNDERGRADUATE SCHOOL, CHEMISTRY, WASHINGTON

SPECTRA AND STRUCTURE OF AMIDOSULFINIC ACID

D. L. FRASCO

NSF-GP-4605
5/65- 5/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2245 FIELD 7A, 7D,20M

UNIV OF MASSACHUSETTS, GRADUATE SCHOOL, CHEMISTRY, MASSACHUSETTS

PHASE TRANSITIONS AND MOLECULAR MOTION IN SOLIDS

J. L. RAGLE

NSF-GP-4507
5/65- 5/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2247 FIELD 7C, 7B

UNIV OF WISCONSIN, GRADUATE SCHOOL, CHEMISTRY, WISCONSIN

ORGANOMETALLIC COMPOUNDS OF GROUP IVB AND VB ELEMENTS

P. M. TREICHEL

NSF-GP-4667
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2250 FIELD 7D,20J

UNIV OF WASHINGTON, GRADUATE SCHOOL, CHEMISTRY, WASHINGTON
STRUCTURE OF COORDINATION COMPOUNDS

E. C. LINGAFELTER

NSF-GP-4446
5/65- 5/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2253 FIELD 7C,20J

TUFTS UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, MASSACHUSETTS

CONFORMATIONS OF CYCLOHEXANE DERIVATIVES

R. D. STOLOW
NSF-GP-4609
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2255 FIELD 7C,20M

UNIVERSITY OF ILLINOIS, GRADUATE SCHOOL, CHEMISTRY + CHEM ENGIN, ILLINOIS

EFFECTS OF STRAIN ON CHEMICAL REACTIVITY

D. E. APPLEQUIST

NSF-GP-4681
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2262 FIELD 7C, 7D

COLLEGE OF WOOSTER, UNDERGRADUATE SCHOOL, CHEMISTRY, OHIO

AROMATIC NUCLEOPHILIC SUBSTITUTION

J. D. REINHEIMER

NSF-GP-4603
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GUE 139 FIELD 7C, 7D,20M

KANSAS ST UNIV AGR SCI, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, KANSAS

DESALINATION BY THE INVERSION IN THE ORDER OF MELTING BY APPLIED PRESSURE

R. G. AKINS, L. E. ERICKSON, L. FAN
/66- /

INTERIOR-OFFICE OF SALINE WATER

GUE 144 FIELD 7C, 7A, 7D, 7B

UNIVERSITY OF MIAMI, GRADUATE SCHOOL, MARINE SCIENCE, FLORIDA

COMPRESSIBILITY AND MOLAL VOLUME STUDIES

W. DROSTHANSEN, H. A. SCHERAGA
/66- /

INTERIOR-OFFICE OF SALINE WATER

GUE 151 FIELD 7C, 7D

AMICON CORPORATION, MASSACHUSETTS

DEVELOPMENT OF HIGH FLUX-HIGH REJECTION REVERSE OSMOSIS MEMBRANES

H. J. BIXLER, R. A. CROSS, A. S. MICHAELS
P. N. RIGOPULOS
/66- /

INTERIOR-OFFICE OF SALINE WATER

08. Earth Sciences and Oceanography

GQF 259161 FIELD 12A, 8E

STANFORD RESEARCH INST, MENLO PARK, CALIFORNIA

DEVELOP TECHNIQUES FOR COMPOSING A WORLD-WIDE CLIMATOLOGY OF TURBULENCE FOR ALTITUDES TO 100 THOUSAND FEET

R. ENDLICH

AF-19-628-05173
/65- /

DOD-AIR FORCE

GQF 259360 FIELD 8N, 8G

BARKLEY DEXTER LABS, FITCHBURG, MASSACHUSETTS

PERFORM ABSOLUTE GRAVITY EXPERIMENT USING REVERSIBLE PENDULUM APPARATUS

NONE

AF-19-628-05085
/65- /

DOD-AIR FORCE

GQF 259370 FIELD 3A, 3B, 8F, 8G

HUGHES AIRCRAFT CO, CULVER CITY, CALIFORNIA

FEASIBILITY STUDY OF LASER RANGING SYSTEMS CAPABLE OF OPERATING AT EARTH-MOON DISTANCES

NONE

AF-19-628-05172
/65- /

DOD-AIR FORCE

GQF 259501 3 FIELD 8G, 8K

BOSTON COLLEGE, GRADUATE SCHOOL, MASSACHUSETTS

RESEARCH ON SEISMICITY OF NEW ENGLAND AREA UTILIZING NETWORK OF 4 SEISMIC SUBSTATIONS

D. J. LINEHAN

AF-19-628-00358
/65- /

DOD-AIR FORCE

GQF 259523 1 FIELD 8K

TEX. INSTR., INC., D, TEXAS

DEV ANALYSIS SYSTEM TO CLASSIFY TELESEISMIC EVENTS BY SOURCE EARTHQUAKE-UNDERGROUND EXPLOSION

H. R. LAKE

AF-19-628-04173
/65- /

DOD-AIR FORCE

GQF 259537 FIELD 8F, 8G

SUPPORT OF COMMITTEE ON REMOTE SENSING OF ENVIRONMENT ESTABLISHED WITHIN NATL ACADEMY OF SCIENCES

J. PLACE
/65- /

DOD-AIR FORCE

GQF 259545 FIELD 8D, 8G

USDI, GEOL SURV, DIST OF COLUMBIA

EXPERIMENTAL STUDY OF LUMINESCENT MINERALS TO DETERMINE THERMOLUMINESENCE RELATION TO RADIATION

S. S. GOLDICH
/65- /

DOD-AIR FORCE

GQF 260428 FIELD 8F, 8G

USN, OFF NAV RES, NAV RES LAB, DIST OF COLUMBIA

PROVIDE AF SHARE OF TRISERVICE SUPPORT OF CONTRACTUAL RESEARCH ON REMOTE SENSING OF ENVIRONMENT

J. PLACE
/65- /

DOD-AIR FORCE

GSB 473 1 FIELD 8D, 8F

CARNEGIE MUSEUM PITT, PENNSYLVANIA

PLEISTOCENE FAUNAS OF THE APPALACHIAN KARST REGION

J. E. GUILDAY, H. HAMILTON, A. D. MCCRADY

NSF-GB-3083
12/65-12/66

NSF-BIOLOGICAL + MEDICAL SCIENCES DIVISI

GSB 588 1 FIELD 8D

UNIV OF CONNECTICUT, GRADUATE SCHOOL, BOTANY, CONNECTICUT

CONTINUED STUDIES OF PALEOZOIC PLANTS

H. N. ANDREWS, T. L. PHILLIPS
N. W. RADFORTH, J. M. SCHOPF

NSF-GB-3196
1/66-12/66

NSF-BIOLOGICAL + MEDICAL SCIENCES DIVISI

GSB 2887 FIELD 8D, 8G, 8H

UNIV OF CAL-L. A., GRADUATE SCHOOL, GEOLOGY, CALIFORNIA

CENOZOIC MARINE GEOLOGY, BIOSTRATIGRAPHY AND PALEOECOLOGY IN THE EASTERN EQUATORIAL PACIFIC OCEAN

H. T. LOEBLICH, J. H. LIPPS

NSF-GB-3684
5/65- 5/66

NSF-BIOLOGICAL + MEDICAL SCIENCES DIVISI

GSB 3900 3 1 FIELD 8D, 8F, 8G

YALE UNIVERSITY, GRADUATE SCHOOL, BIOLOGY, CONNECTICUT

PALEONTOLOGY AND STRATIGRAPHY OF THE LOWER CRETACEOUS DEPOSITS OF THE BIGHORN BASIN REGION

J. H. OSTROM

NSF-GB-1015
6/65- 6/66

NSF-BIOLOGICAL + MEDICAL SCIENCES DIVISI

GSP 1238 2 FIELD 8G

UNIV OF CAL-LA JOLLA, GRADUATE SCHOOL, EARTH SCIENCES, CALIFORNIA

THE GRAYWACKE-VOLCANIC SUITE

A. E. ENGEL

NSF-GP-2364
12/65-12/66

NSF-PHYSICAL SCIENCES DIVISION

GUW 160 FIELD 13B, 8H,11A,11G

UNIV OF TENNESSEE, AGRICULTURAL EXPT STA, AGRIC ENGINEERING, TENNESSEE

SMALL RESERVOIR SEALING

J. I. SEWELL

INT-WR-A-003-TENN
/66- /

INTERIOR-OFFICE OF WATER RESOURCES

GUW 315 FIELD 8H,12A, 5C, 8E

UNIVERSITY OF WYOMING, SCHOOL OF ENGINEERING, NATURAL RESOURCES INST, WYOMING

WATER RESOURCE OPERATIONS STUDY

J. C. BELLAMY

INT-WR-A-001-WYO
/66- /

INTERIOR-OFFICE OF WATER RESOURCES

GUW 317 FIELD 13G, 8H

UNIV OF MINNESOTA, GRADUATE SCHOOL, CIVIL ENGINEERING, MINNESOTA

REVIEW AND ANALYSIS OF PRECIPITATION AND RUNOFF DATA FOR SELECTED WATERSHEDS IN MINNESOTA

C. E. BOWERS

INT-WR-A-013-MINN
/66- /

INTERIOR-OFFICE OF WATER RESOURCES

GUW 348 FIELD 8H,12A, 8E

OHIO STATE UNIVERSITY, SCHOOL OF AGRICULTURE, AGRIC ENGINEERING, OHIO

HYDROLOGIC INVESTIGATION OF WATERSHEDS IN OHIO

E. P. TAIGANIDES

INT-WR-B-005-OHIO
10/65- 7/66

INTERIOR-OFFICE OF WATER RESOURCES

09. Electronics and Electrical Engineering

GQF 259016 2 FIELD 9+,12A, 5C, 8E

STANFORD RESEARCH INST, MENLO PARK, CALIFORNIA

RSCH ON PROPS + DESIGN OF HI-SPEED COMPUTER NETWORKS WHEREIN PROPAGATION TIME OF SIGNALS IS IMPORTANT

J. GOLDBERG

AF-19-628-02902
/65- /

DOD-AIR FORCE

GQF 259091 1 FIELD 9C, 9+, 9A,20I

UNIVERSITY OF ARIZONA, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, ARIZONA

EXPERIMENTAL STUDY OF EFFECTS OF PLASMA ON ANTENNAS USING PLASMA SIMULATION CHAMBER

G. TYRAS

AF-19-628-03834
/65- /

DOD-AIR FORCE

GQF 259116 4 FIELD 8+, 9+, 9A

UNIV OF INNSBRUCK, AUSTRIA

THEORETICAL + EXPERIMENTAL STUDIES OF THE PROPERTIES OF VLF EM WAVES IN LIQUID + SOLID MEDIA

W. BITTERLICH

AF-61-052-00490
/65- /

DOD-AIR FORCE

GQF 259339 FIELD 9+, 9A

PROCUREMENT OF COMPONENTS FOR ELECTRON PROBE

. NONE

AF-19-628-04754
/65- /

DOD-AIR FORCE

GQF 259441 FIELD 9+,20J,20F,20L

UNIVERSITY OF FLORENCE, ITALY

THEORET + EXPER STUDY OF THE FIELD RESONANCES + MODE QIS OF LASER RESONATORS VIA MICROWAVE MODELS

G. T. DIFRANCIA

AF-61-052-00871
/65- /

DOD-AIR FORCE

GQF 260472 FIELD 9+, 9A

USDC, NATL BUR STAN, BOULDER, COLORADO

THEORETICAL + EXPERIMENTAL STUDIES ON ANTENNA OPTIMIZATION TECHNIQUES + NON-UNIFORM SPACED ELEMENTS

M. T. MA
/65- /

DOD-AIR FORCE

GSE 639 1 FIELD 9+,12A, 9D

UNIV OF ROCHESTER, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, NEW YORK

MODULATION THEORY

H. B. VOELCHER

NSF-GK-118
12/65-12/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 788 FIELD 9+

OHIO UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, OHIO

TOPOLOGICAL SYNTHESIS OF DRIVING-POINT FUNCTIONS

W. CHEN

NSF-GK-173
3/65- 3/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 791 FIELD 9+

PRINCETON UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, NEW JERSEY

SAMPLING THEORY

B. LIU, J. B. THOMAS

NSF-GK-187
4/65- 4/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 793 FIELD 9+

NORTHWESTERN UNIV, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, ILLINOIS

SUB-OPTIMAL AUTOMATIC CONTROL

Z. V. REKASIUS

NSF-GK-186
4/65- 4/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 797 FIELD 9+

PURDUE UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, INDIANA

NONSTATIONARY CROSSCORRELATION ESTIMATES

G. R. COOPER

NSF-GK-189
4/65- 4/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 804 FIELD 9+

POLYTECH INST BROOKLYN, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, NEW YORK

THREE STUDIES IN TOPICS OF NETWORK THEORY

H. RUSTON

NSF-GK-236
4/65- 4/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 826 FIELD 9+

CARNEGIE INST TECHNOL, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, PENNSYLVANIA

RANDOMLY FORCED NONLINEAR CONTROL SYSTEMS

W. H. PIERCE

NSF-GK-373
5/65- 5/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 836 FIELD 9+

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, MICHIGAN

OPTIMAL CONTROL AND STABILITY THEORY

A. W. NAYLOR, K. B. IRANI

NSF-GK-234
4/65- 4/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 841 FIELD 9+, 9A, 5A

ANTENNA ARRAYS

R. W. KING

NSF-GK-273
6/65- 6/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 849 FIELD 9+

STANFORD UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

EQUIVALENT NETWORKS AND N-PORT SYNTHESIS

R. W. NEWCOMB

NSF-GK-237
4/65- 4/66

NSF-ENGINEERING SCIENCES DIVISION

11. Materials

GPF 46 3 FIELD 7C, 7D,20J

UNIVERSITY OF GEORGIA, GRADUATE SCHOOL, PHYSICS + ASTRONOMY, GEORGIA

INFRARED SPECTRA OF PLASTICS AND ELASTOMERS AFTER NUCLEAR IRRADIATION

W. C. SEARS, B. H. MOORE
AT(40-1)2418
1/66-12/66

AEC-DIVISION OF PHYSICAL RES

GPF 464 4 FIELD 20M,11F,13H,11G

TEMPLE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

A STUDY OF THE IB-IIB BETA PHASE ALLOYS

L. MULDAWER, H. AMAR

AT-30-1-2812
8/65- 7/66

AEC-DIVISION OF PHYSICAL RES

GPF 767 2 1 FIELD 11F,13H,11G,20L

MASS INST OF TECHNOL, SCHOOL OF ENGINEERING, METALLURGY, MASSACHUSETTS

MECHANICAL PROPERTIES OF METALS AT LOW TEMPERATURES

W. A. BACKOFEN
AT-30-1-1310
10/64-10/65

AEC-DIVISION OF PHYSICAL RES

GSE 635 1 FIELD 11B

UNIV OF CAL-BERKELEY, SCHOOL OF ENGINEERING, INST ENGINEERING RES, CALIFORNIA

EFFECT OF STRESS AND SHRINKAGE ON THE STRUCTURE OF HYDRATED ALITE

D. PIRTZ, M. POLIVKA

NSF-GK-113
12/65-12/66

NSF-ENGINEERING SCIENCES DIVISION

GSP 2210 FIELD 7D, 7B

RENSSELAER POLYTC INST, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

SURFACE PROPERTIES OF GRAPHITE

S. ROSS

NSF-GP-4430
5/65- 5/66

NSF-PHYSICAL SCIENCES DIVISION

12. Mathematical Sciences

GSE 723 FIELD 13F,12A, 9D, 5C

CARNEGIE INST TECHNOL, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, PENNSYLVANIA

HEURISTIC GAMES FOR ENGINEERING DESIGN

T. AU
NSF-GK-582
9/65- 8/66

NSF-ENGINEERING SCIENCES DIVISION

GSM 23 4 FIELD 12A

STANFORD UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, CALIFORNIA

THE FOUNDATION OF MATHEMATICS

D. SCOTT, G. KREISEL, W. W. TAIT

NSF-GP-3926
1/66- 1/67

NSF-MATHEMATICAL SCIENCES DIVISION

GSM 522 1 FIELD 12A

FLORIDA STATE UNIV, GRADUATE SCHOOL, STATISTICS, FLORIDA

GRAPH THEORY IN STATISTICS

W. A. THOMPSON

NSF-GP-3807
12/65-12/66

NSF-MATHEMATICAL SCIENCES DIVISION

GSP 2368 FIELD 12A

MANSAS ST UNIV AGR SCI, GRADUATE SCHOOL, STATISTICS, KANSAS

IRREGULAR FRACTIONAL REPLICATION PLANS

K. S. BANERJEE
NSF-GP-4618
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2370 FIELD 12A

CAL ST COLL, HAYWARD, UNDERGRADUATE SCHOOL, MATHEMATICS, CALIFORNIA

ESTIMATION AND TESTS OF HYPOTHESES OF THE RELIABILITY PARAMETER

G. J. RESNIKOFF, G. ●. RESNIKOFF
NSF-GP-4669
9/65- 9/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2371 FIELD 12A

RUTGERS THE STATE UNIV, GRADUATE SCHOOL, STATISTICS, NEW JERSEY

SELECTION OF INDEPENDENT VARIATES IN REGRESSION

A. COHEN

NSF-GP-4644
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2374 FIELD 12A

NORTHEASTERN UNIV, GRADUATE SCHOOL, MATHEMATICS, MASSACHUSETTS

ERGODIC THEORY

A. HAJIAN
NSF-GP-4574
7/65- 7/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2375 FIELD 12A

UNIV OF CAL-DAVIS, GRADUATE SCHOOL, MATHEMATICS, CALIFORNIA

ALGEBRAIC SUMS OF SETS

S. K. STEIN

NSF-GP-4607
7/65- 7/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2384 FIELD 12A

RUTGERS THE STATE UNIV, GRADUATE SCHOOL, MATHEMATICS, NEW JERSEY

LIGHT OPEN MAPPINGS ON 3-MANIFOLDS

L. F. MCAULEY

NSF-GP-4571
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2385 FIELD 12A

POLYTECH INST BROOKLYN, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

GROUP THEORY

E. S. RAPAPORT, H. V. WALDINGER

NSF-GP-4542
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2387 FIELD 12A

UNIV OF CAL-L. A., GRADUATE SCHOOL, MATHEMATICS, CALIFORNIA

THEORY OF CONVEXITY AND OF SYSTEMS OF INEQUALITIES

T. S. MOTZKIN

NSF-GP-4519
7/65- 7/66

NSF-PHYSICAL SCIENCES DIVISION

GSP 2388 FIELD 12A

PURDUE UNIVERSITY, GRADUATE SCHOOL, MATHEMATICAL SCIENCES, INDIANA

MULTIVARIATE STATISTICS

K. C. PILLAI

NSF-GP-4600
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

13. Mechanical, Industrial, Civil, and Marine Engineering

GUW 22 1 FIELD 13B, 8H

OHIO STATE UNIVERSITY, GRADUATE SCHOOL, GEOLOGY, OHIO

A STUDY OF GROUNDWATER CONTAMINATION DUE TO SALINE WATER DISPOSAL IN THE MORROW COUNTY OIL FIELDS

J. H. LEHR

INT-WR-A-004-OHIO
1/66- 6/67

INTERIOR-OFFICE OF WATER RESOURCES

14. Methods and Equipment

GQF 260874 FIELD 9+

BARKLEY DEXTER LABS, FITCHBURG, MASSACHUSETTS

RESEARCH DIRECTED TOWARDS INVESTIGATION OF DESIGN OF NEWLY ACQUIRED GRAV METER SYS FOR COMPATIBILITY WITH EXISTING SYSTEMS

NONE

/65- /

DOD-AIR FORCE

18. Nuclear Science and Technology

GPF 757 1 FIELD 20D, 5A,20I,20L

CORNELL UNIVERSITY, SCHOOL OF ENGINEERING, APPLIED PHYSICS, NEW YORK

THEORY OF SLOW NEUTRON INELASTIC SCATTERING BY LIQUIDS

M. NELKIN, C. R. RATHBONE

AT-30-1-3326
9/65- 9/66

AEC-DIVISION OF PHYSICAL RES

GPF 934 FIELD 5A,18A, 7D, 7B

UNIVERSITY OF WYOMING, GRADUATE SCHOOL, PHYSICS, WYOMING

NUCLEAR PHYSICS STUDIES USING NUCLEAR EMULSIONS

W. G. SIMON, S. AHRENS, V. STARKOVICH

AT(11-1)1549
11/65-10/66

AEC-DIVISION OF PHYSICAL RES

20. Physics

GPF 4 3 FIELD 7D,20M,20J

UNIV OF CAL-LA JOLLA, GRADUATE SCHOOL, CHEMISTRY, CALIFORNIA
INTERACTING ATOMS

J. E. MAYER, T. S. REE
AT-11-1-34-65
10/65- 9/66

AEC-DIVISION OF PHYSICAL RES

GPF 10 2 FIELD 5A,18A,20H

UNIVERSITY OF COLORADO, GRADUATE SCHOOL, PHYSICS, COLORADO

HIGH ENERGY PHYSICS

L. MARSHALL

AT-11-1-1330
9/65- 8/66

AEC-DIVISION OF PHYSICAL RES

GPF 44 3 FIELD 18A,20H, 7B

BRANDEIS UNIVERSITY, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

RESEARCH IN ELEMENTARY PARTICLE PHYSICS
S. E. WOLFI, M. MEER, M. SCHNEEBERGER

AT(30-1)3178
9/65- 8/66

AEC-DIVISION OF PHYSICAL RES

GPF 103 3 FIELD 12A, 9D,18A,20H

OHIO STATE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, OHIO

HIGH ENERGY PHYSICS

T. A. ROMANOWSKI, W. T. CHU, Y. S. KIM
K. REIBEL, K. TANAKA, W. W. WADA

AT(11-1)-1261
10/65- 9/66

AEC-DIVISION OF PHYSICAL RES

GPF 727 5 FIELD 20J, 5A,20F,20I

STEVENS INST OF TECH, GRADUATE SCHOOL, PHYSICS, NEW JERSEY

EXPERIMENTAL INVESTIGATION OF CUSPED CONTAINMENT GEOMETRIES

G. J. YEVICK, G. VONVOROS, A. WALY
AT-30-1-2582
9/65- 8/66

AEC-DIVISION OF PHYSICAL RES

GPF 801 1 FIELD 20J, 7B

PRINCETON UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, NEW JERSEY

HIGH ACCURACY, MANY-ELECTRON CALCULATIONS FOR NOBLE GAS MOLECULES

L. C. ALLEN

AT(30-1)3532
11/65-10/66

AEC-DIVISION OF PHYSICAL RES

GPF 921 FIELD 12A, 7D

UNIV OF ROCHESTER, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

NUCLEAR REACTION MECHANISMS

M. BLANN, Y. YU

AT(30-1)-3591
9/65- 8/66

AEC-DIVISION OF PHYSICAL RES

GPF 937 FIELD 20M,20J, 5A,20L

UNIV OF CAL-L. A., GRADUATE SCHOOL, PHYSICS, CALIFORNIA

EXPERIMENTAL RESEARCH IN SOLID STATE PHYSICS BY MAGNETIC RESONANCE METHODS

W. G. CLARK
AT(11-1)34-121
1/66-12/66

AEC-DIVISION OF PHYSICAL RES

GPF 938 FIELD 9+,20J, 5A,20F

UNIV OF CAL-L. A., GRADUATE SCHOOL, PHYSICS, CALIFORNIA

EXPERIMENTAL RESEARCH IN SOLID STATE PHYSICS BY MAGNETIC RESONANCE METHODS

W. G. CLARK

AT(11-1)34-121
1/66-12/66

AEC-DIVISION OF PHYSICAL RES

GQF 259054 FIELD 20F

THEORETICAL STUDY OF NATURAL IN VARIANCES IN ELECTROMAGNETIC THEORY

A. YILDIZ
AF-19-628-04380
/65- /

DOD-AIR FORCE

GQF 259055 FIELD 12A,20H,20F

LOCKHEED AIRCRAFT CORP, SUNNYVALE, CALIFORNIA

THEORETICAL STUDY OF ELECTROMAGNETIC SCATTERING + DIFFRACTION BY CONVEX OBJECTS

N. A. LOGAN

AF-19-628-04393
/65- /

DOD-AIR FORCE

GQF 259094 1 FIELD 20M,20F,20L

RAYTHEON CO., WALTHA, MASSACHUSETTS

THEORETICAL + EXPERIMENTAL STUDIES ON THE BEHAVIOR OF FERROMAGNETICS AT HIGH POWER MICROWAVES

E. SCHLOMANN
AF-19-628-03861
/65- /

DOD-AIR FORCE

GQF 259369 2 FIELD 3A, 5A,20I

STEVENS INST OF TECH, SCHOOL OF ENGINEERING, PHYSICS, NEW JERSEY

RESEARCH ON BEHAVIOR OF IONIZED GASES IN A MAGNETIC FIELD UNDER SHOCK CONDITIONS

W. H. BOSTICK
AF-19-628-02398
/65- /

DOD-AIR FORCE

GQF 259384 FIELD 20L

AMER SC + ENGR CO, MASSACHUSETTS

GROWTH OF SINGLE CRYSTALS SUITABLE FOR X-RAY STRUCTURE DETERMINATION OF CHARGE-TRANSFER COMPLEXES

C. W. COBB

AF-19-628-04239
/65- /

DOD-AIR FORCE

GQF 259470 FIELD 5A,20F

UNIV OF ROCHESTER, GRADUATE SCHOOL, PHYSICS, NEW YORK

THEORET + ANALY EFFORT ON VISIBILITY FUNCTIONS FROM ITERFEROMETERS OBTAIN UNIQUE RADIATION SPECTRUM

B. WOLF
AF-19-628-04771
/65- /

DOD-AIR FORCE

GQF 259552 FIELD 20J, 5A,20F

UNIV OF ROCHESTER, GRADUATE SCHOOL, PHYSICS, NEW YORK

THEORETICAL + EXPERIMENTALEFFORT ON COHERENCE PROPS OF LASER RADIATION FIELDS + INTERACTIONS WITH MATTER

L. MANDEL

AF-19-628-05052
/65- /

DOD-AIR FORCE

GQF 259604 FIELD 20F

UTAH ST UNIV OF AGRIC, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, UTAH

ANALYTICAL + EXPERIMENTAL STUDIES TO ESTABLISH IMAGING LIMITS OF FINITE OBJECTS IN VISIBLE + IR

D. J. BAKER
AF-19-628-03825
/65- /

DOD-AIR FORCE

GQF 259873 FIELD 9+, 9A,20J,20L

NORTHEASTERN UNIV, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, MASSACHUSETTS

EFFORT ON III-V-III-VI COMPOUND SINGLE CRYSTAL GROWTH-P-N JUNCTION FORMATION AND MEASUREMENT

B. L. COCHRUN
AF-19-628-04759
/65- /

DOD-AIR FORCE

GQF 259874 FIELD 5A,20L

LITTLE ARTHUR D INC, MASSACHUSETTS

FOR ARRANGEMENTS + ADMINISTRATION OF AFCRL SPONSORED INTERNATIONAL CONFERENCE ON CRYSTAL GROWTH

. NONE
AF-19-628-05071
/65- /

DOD-AIR FORCE

GQF 259934 FIELD 20J,20F,20L

RCA RES LAB, PRINCETON, NEW JERSEY

COMPREHENSIVE EFFORT TO IMPROVE SENSITIVITY + VERSATILITY OF SPARK SOURCE SOLIDS MASS SPECTROGRAPH

. NONE
AF-19-628-05106
/65- /

DOD-AIR FORCE

GQF 260420 FIELD 20J

QUANTUM-THEORET LASER STUDY WITH EMPHASIS ON RADIATION REACTION + ITS EFFECT ON LASER EMISSION

S. BARONE

AF-19-628-05111
/65- /

DOD-AIR FORCE

GQF 260421 FIELD 20J,20F,20I

YALE UNIVERSITY, SCHOOL OF ENGINEERING, ENGINEERING + APPL SCI, CONNECTICUT

THEORET + EXPER EFFORT ON INTERACTION OF EM WAVES WITH A PLASMAIC CYCLOTRON-RESONANCE INSTABILITY

J. L. HIRSHFIELD
AF-19-628-05104
/65- /

DOD-AIR FORCE

GQF 284602 2 FIELD 20F,20I

UNIV OF CAL-BERKELEY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

ELECTROMAGNETIC PROPERTIES OF IONIZED GASES

A. W. TRIVELPIECE
AF-33-615-01078
/65- /

DOD-AIR FORCE

GQF 284827 2 FIELD 20I

ELCON LABORATORIES, MASSACHUSETTS

INTERACTION OF ELECTROMAGNETIC WAVES AND CLASSICAL PLASMAS

E. LANDBERG
AF-33-657-11671
/65- /

DOD-AIR FORCE

GQF 388091 2 FIELD 20L,20D,20K,20A

UNIV OF GOTTINGEN, GERMANY

INTERACTION BETWEEN AIR FLOW AND AIRBORNE SOUND IN A DUCT

F. P. MECHEL, P. MERTENS
AF-61-052-0666
/65- /

DOD-AIR FORCE

GQF 435134 FIELD 20J,20F

FABRICATION AND SERVICES FOR SPECIAL OPTICAL COMPONENTS

. NONE

AF-33-615-640
/65- /

DOD-AIR FORCE

GSE 747 FIELD 20M,20D,10B,20I

CARNEGIE INST TECHNOL, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, PENNSYLVANIA

ELECTROMAGNETICALLY INDUCED VISCOUS FLOW

F. J. YOUNG

NSF-GK-599
9/65- 8/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 750 FIELD 20M,20D,20F

UNIV OF NOTRE DAME, SCHOOL OF ENGINEERING, INDIANA

RADIANT HEAT TRANSFER BETWEEN TWO HORIZONTAL PLATES

J. L. NOVOTNY

NSF-GK-672
10/65- 9/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 763 FIELD 7D, 7A,20D

CAL INST OF TECHNOLOGY, SCHOOL OF ENGINEERING, CHEMISTRY + CHEM ENGIN, CALIFORNIA

RHEOLOGY OF SUSPENSIONS WITH VARYING PARTICLE SIZE DISTRIBUTIONS

G. R. COKELET

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11/65-10/66

NSF-ENGINEERING SCIENCES DIVISION

GSE 842 FIELD 7D,20M

MASS INST OF TECHNOL, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, MASSACHUSETTS

RADIATIVE TRANSFER THROUGH HETEROGENEOUS MATERIALS

H. C. HOTTLE, L. B. EVANS, A. F. SAROFIM

NSF-GK-220
4/65- 4/66

NSF-ENGINEERING SCIENCES DIVISION

GSS 954 FIELD 5A

AMER INST PHYSICS, NEW YORK

ADDITIONAL RESEARCH FACILITIES IN THE HISTORICAL DEVELOPMENT OF RECENT PHYSICS

E. WELNER
NSF-GS-859
7/65- 7/66

NSF-SOCIAL SCIENCES DIVISION

NIL 142 FIELD 20L,20K

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

A GENERAL FORMULATION OF THE ELASTIC-PLASTIC ANALYSIS OF SPACE FRAMEWORKS

S. J. FENVES, E. K. BRUINETTE
/65- /

ILLINOIS, UNIVERSITY OF

ZQF 260079 FIELD 4A,20I

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

EM ROCKET OBSERVATIONS

R. O. HUTCHINSON
/65- /

DOD-AIR FORCE

ZQF 260080 FIELD 4A, 8+, 9+, 7B

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

EM SATELLITE OBSERVATIONS

B. M. SHUMAN
/65- /

DOD-AIR FORCE

ZQF 260082 FIELD 4A, 8+, 9+, 7B

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

EM INSTRUMENTATION

J. F. KELLIHER
/65- /

DOD-AIR FORCE

ZQF 260159 FIELD 4A,20I

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

MAGNETO SHOCK DYNAMICS

M. LEVINE
/65- /

DOD-AIR FORCE

ZQF 260552 FIELD 4A,20I,20A, 7B

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

GASEOUS ELECTRONICS

S. B. HERSKOVITZ
/65- /

DOD-AIR FORCE

ZQF 420558 FIELD 20M,20D,10B

USAF, ARNOLD AFS, TENNESSEE

CONTROL OF SUPERSONIC FLOW BY CRYOPUMPING

W. B. STEPHENSON

AF-40-600-1000
/65- /

DOD-AIR FORCE

TECHNICAL ABSTRACT BULLETIN

Field 1-AERONAUTICS

1/1. AERODYNAMICS

AD-630 168 See Fld. 20/4

AD-630 268 See Fld. 20/4

1/2. AERONAUTICS

AD-629 765 Fld. 1/2, 21/4
CFSTI Prices: HC $2.00 MF $0.50
WESTERN CO OF NORTH AMERICA.DALLAS TEX RESEARCH DIV
RAPID GELLING OF AIRCRAFT FUEL.
Final rept.,
by A. R. Schleicher. Feb 66, 34p. Contract DA-44-177-AMC-112(T), Task 1D121401A14216, USAAVLABS TR-65-18
Unclassified report

Descriptors: (*Gels, Jet engine fuels), (*Jet engine fuels, Gels), (*Aviation accidents, Fire safety), Soaps, Amines, impact shock, Tests, Burning rate

Experimental evidence has shown that the severity of accidental hydrocarbon fuel fires can be reduced by chemically solidifying the liquid fuel. The purpose of the subject work was to determine the feasibility of utilizing this principle to reduce the dangers of postcrash aircraft fires. The feasibility of rapidly gelling large quantities of aircraft fuel has been investigated and established. The types and quantities of chemical gelling agents required were investigated. The times required for the gelling of 50-gallon quantities of fuel have been determined. Mechanisms and power sources for mixing gelling agents with fuel have been evaluated. The hazards and penalties associated with these systems have been established. Impact tests were made to determine the reduction of fire hazard with gelled fuel under dynamic conditions. These tests showed radical differences in performance between gels which behave similarly under static tests. Soap type and amine-isocyanate gels have about equal effectiveness in reducing fire harzards in small scale experiments. The performance of the soap system was decidedly superior in terms of achieving rapid gelling of large quantities of fuel. (Author)

AD-629 769 Fld. 1/2, 15/5, 5/1
CFSTI Prices: HC $2.00 MF $0.50
RAND CORP SANTA MONICA CALIF
SYSTEMS ANALYSIS AS AN AID IN AIR TRANSPORTATION PLANNING,
by Donald M. Fort. Mar 66, 45p. Rept. no. P-3293-1,
Unclassified report

Prepared for presentation at National Transportation Symposium, San Francisco May 6 1966. See also AD-627 384.

Descriptors: (*Air transportation, Management planning), Systems engineering, Supersonic planes, Commercial planes, Transport planes, Costs, Uncertainty

Following some general remarks on the subject, consideration is given to the application of systems analysis to a few arbitrarily selected non-military air transportation planning problems, to illustrate various pertinent points. The emphasis is on the important initial steps in formulating the analysis, beginning with the identification and definition of the problem. The need for realistic and relevant inputs is stressed. No attention is given to particular analytical or computational model or techniques. It is suggested that systems analysis can be anything from very useful to worse than useless in air transportation planning, depending on the quality of the analysis. (Author)

AD-629 931 Fld. 1/2, 13/10
CFSTI Prices: HC $6.60 MF $0.75
NAVAL AIR ENGINEERING CENTER PHILADELPHIA PA AERONAUTICAL STRUCTURES LAB
STATISTICAL PRESENTATION OF LANDING PARAMETERS FOR MODEL A-1H AIRCRAFT ABOARD THE USS ORISKANY (CVA-34) IN THE WESTPAC AREA.
Summary rept. 24 Jan-19 Feb 64,
by Warren J. Williams. 1 Mar 66, 64p. Rept. no. NAEC-ASL-1093,
Unclassified report

Descriptors: (*Carrier landings, Statistical analysis), Pacific Ocean, Aircraft carriers, Probability, Statistical data

A statistical analysis of aircraft approach and landing contact data for normal fleet operations in WESTPAC for the model A-1H aircraft during January and Febraury 1964. The parameters are presented in the form of histograms and probability curves. Statistical values for each parameter are listed in the summary table. (Author)

AD-630 130 Fld. 1/2
CFSTI Prices: HC $1.10 MF $0.50
NAVAL SCHOOL OF AVIATION MEDICINE PENSACOLA FLA
STUDIES OF AIRCRAFT ACCIDENTS INVOLVING OFFICER TRAINEES IN THE BASIC TRAINING COMMAND FOR FISCAL 1951. PART II. A COMPARISON OF THE ACCIDENT RATE OF STUDENT OFFICER TRAINEES WHO COMMUTE FROM PENSACOLA TO WHITING FIELD AND OFFICERS RESIDING IN THE WHITING FIELD AREA.
Special rept.,
by William F. Madden. 30 Jun 52, 5p.
Unclassified report

Descriptors: (*Aviation accidents, Officer personnel), (*Students, Aviation accidents), Aviation safety, Training, Probability

The report is one of the series of studies attempting to identify factors contributing to aircraft accidents incurred by officer students in the Basic Training Command during Fiscal 1951. Accident data were analyzed to determine whether or not the student officers who commuted eighty miles daily to and from Pensacola to Whiting Field sustained a larger number of accidents than those officers who resided at or close to Whiting Field during their early phases of flight training. An analysis of the data indicated that there were no significant differences in the number of accidents sustained by the officer students who commuted from Pensacola each day and those who lived at Whiting Field and had no such travel problem. (Author)

1/3. AIRCRAFT

AD-629 773 Fld. 1/3
CFSTI Prices: HC $3.60 MF $0.50
LITTON SYSTEMS INC ST PAUL MINN APPLIED SCIENCE DIV
FREE BALLOONS WITH OFF-DESIGN PAYLOADS,
by Justin H. Smalley. 31 Dec 65, 40p. Rept. no. 2927,Scientific-2
Contract AF 19(628)-5131, Proj. AF-6665, Task 666501,
AFCRL 66-21
Unclassified report

Descriptors: (*Balloons, Experimental design), Geometric forms, Payload, Aerodynamic characteristics, Membranes, Stresses, Numerical analysis

The membrane equations for an axi-symmetric balloon and the equation of equilibrium are modified for application at conditions other than the design payload and design altitude. Examples are presented which show the change of shape, stresses, volume and float altitude resulting from payloads different than the design value. It is shown that, for payloads greater than the design value, local radius decreases everywhere so that no fullness is required to maintain zero circumferential stress. For payloads less than the design value, circumferential stresses are developed in the fully tailored portions. (Author)

AD-629 774 Fld. 1/3
CFSTI Prices: HC $5.60 MF $0.50
LITTON SYSTEMS INC ST PAUL MINN APPLIED SCIENCE DIV
MODIFICATION OF THE ROBIN METEOROLOGICAL BALLOON VOLUME I. DESIGN AND TEST.
Final rept., 15 Apr 63-30 Apr 65,
by J. H. Smalley, and L. R. Flink. 30 Sep 65, 52p. Rept. no. 2873,
Contract AF 19(628)-2945, Proj. AF-6670, Task 667004,
AFCRL 65-734-VOL-1
Unclassified report

Descriptors: (*Meteorological balloons, Design), Packaging, Nose cones, Sounding rockets, Inflatable structures, Altitude chambers, Flight tests

A program is described to modify the ROBIN meteorological balloon system to improve the inflatant capsule, to design a gaseous inflation system and to design a packaging canister. Capsule design was not greatly altered except to reduce the size of the orifices. The gaseous inflation system was found to be too costly. The canister design is entirely mechanical and, in chamber tests, has ejected and opened reliably. A series of altitude chamber tests and flight tests is described. The promise of the ROBIN system has not yet been fully realized. (Author)

AD-629 775 Fld. 1/3
CFSTI Prices: HC $8.60 MF $0.75
MINNESOTA UNIV MINNEAPOLIS DEPT AUTICS AND ENGINEERING MECHANICS
MODIFICATION OF THE ROBIN METEOROLOGICAL BALLOON. VOLUME II. DRAG EVALUATIONS.
Final rept., 15 Apr 63-30 Apr 65,
by H. G. Heinrich, R. J. Niccum, E. L. Haak, L. R. Jamison, and R. L. George. 30 Sep 65, 84p. Rept. no. 2873,
Contract AF 19(628)-2945, Proj. AF-6670, Task 667004,
AFCRL 65-734-Vol-2
Unclassified report

Document includes Part A, The Drag Coefficient of Spheres at Ranges of Reynolds Numbers Between 150 and 2500 and Mach Numbers up to 3.2 and Part B Measurements of Lift and Drag Coefficients of a Rotating Sphere in Subsonic Flow.

Descriptors: (*Meteorological balloons, Aerodynamics), (*Aerodynamics, Meteorological balloons), (*Drag, Meteorological balloons), Wind tunnels, Model tests, Subsonic flow, Supersonic flow, Aerodynamic characteristics

The drag coefficients corresponding to the Mach and Reynolds number conditions imposed on a

215-084 O-66-1

light weight sphere (Robin) falling from 330,000 ft to 260,000 ft were established experimentally in the University of Minnesota supersonic low density wind tunnel. The Reynolds number was varied from 100 to 2,500, while the Mach number was varied from 1.2 to 3.17. In addition changes to previously reported subsonic values of drag coefficients due to improved testing techniques are included. The lift and drag coefficients of a rotating sphere in subsonic flow have been measured and are compared with analytically derived values. The tests were conducted with a 6 in. model and show variation of the lift and drag depending on the ration of the rotational and lateral velocities with limiting values of 0.5 and 0.6, respectively. (Author)

AD-629 874 Fld. 1/3, 5/9
CFSTI Prices: HC $1.60 MF $0.50
FEDERAL AVIATION AGENCY WASHINGTON D C AIRCRAFT DEVELOPMENT SERVICE
SOME CONSIDERATIONS IN THE USE OF FLIGHT SIMULATORS IN THE SUPERSONIC TRANSPORT PROGRAM,
by Joseph K. Power. 1963, 16p.
Unclassified report

Prepared for presentation to the ASME International Simulation Conference (2nd), Los Angeles, Calif., 4-6 Mar 63.

Descriptors: (*Flight simulators, Tests), (*Supersonic planes, Design), (*Transport planes, Design), Simulation, Human engineering, Training, Flight testing, Performance (Human)

Simulators provide an effective tool to augment flight research in support of wind-tunnel, analytical, operational, and hardware research for future supersonic transport aircraft. In addition, new simulator research techniques are extremely valuable in developing FAA certification regulatory and operation techniques and to assist in the evaluation and selection of SST aircraft designs. (Author)

AD-629 782 See Fld. 20/4

AD-630 418 See Fld. 16/4

Field 2-AGRICULTURE

2/2. AGRICULTURAL ECONOMICS

AD-629 887 See Fld. 6/6

2/5. ANIMAL HUSBANDRY

AD-629 959 Fld. 2/5
ARMED FORCES INST OF PATHOLOGY WASHINGTON D C VETERINARY PATHOLOGY DIV
CYSTIC MUCINOUS HYPERTROPHY OF THE MUCOSA OF THE GALL BLADDER IN THE DOG,
by Robert M. Kovatch, Paul K. Hilderbrandt, and Leonard C. Marcus. 1965, 11p.
Unclassified report

Availability: Published in Path. Vet. v2 p574-84 1965. Copies to DDC users only.

Descriptors: (*Gallbladder, Pathology), (*Pathology, Dogs), (*Dogs, Gallbladder), Mucus, Membranes (Biology), Mucin, Histology, Histological techniques, Veterinary medicine

Cystic mucinous hypertrophy was observed in the gall bladder of nine mature to aged dogs that had no known clinical signs referable to the condition. The cause could not be determined. (Author)

Field 3-ASTRONOMY AND ASTROPHYSICS

3/1. ASTRONOMY

AD-629 882 Fld. 3/1, 3/3
CFSTI Prices: HC $3.00 MF $0.75
BOEING SCIENTIFIC RESEARCH LABS SEATTLE WASH MATHEMATICS RESEARCH LAB
LUNAR PROFILES DETERMINED FROM ANNULAR SOLAR ECLIPSES OF 1962 AND 1963,
by M. Davidson, C. L. Goudas, and Z. Kopal.
Oct 65, 75p. Rept. no. D1-82-0470, Mathematical Note-428
Unclassified report

Also available from the authors. Prepared in cooperation with Manchester Univ. (England).

Descriptors: (*Solar eclipses, Moon), (*Moon, Configuration), Photographic analysis, Celestial mechanics, Astronomical data

The lunar profile deduced from the 1962 eclipse plates was found to be insufficiently well-defined due to the effects of irradiation. The 1963 eclipse plates were, however, largely free from this defect, and their analysis led to satisfactory results. The outcome of the reductions revealed that the deviations of the lunar profile from a circle were of the form +0 sec.54 sin 2 beta - 0 sec.16 cos 2 beta + 0 sec.27 sin 3 beta - 0 sec.05 cos 3 beta 0 sec.16 sin 4 beta + 0 sec.11 cos 4 beta, where beta denotes the lunar position angle measured from the eastern part of the equator in the counter-clockwise direction. These deviations were compared with the preceding lunar limb determination and found to be in satisfactory agreement; in particular, they agree within the limits of observational errors with the profiles obtained by Potter (1962) and Watts (1963). The elliptical component of the profile is found to have its major axis inclined by approximately 37 degrees to the lunar axis of rotation--a value which is almost identical with that given by Watts. (Author)

AD-629 983 Fld. 3/1
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
PROGRESS IN SELENODESY.
Special repts.,
by Mahlon S. Hunt. 1965, 21p. Rept. no. AFCRL-SR-39 ,AFCRL-66-32
Proj. AF-8654, Task 865401,
Unclassified report

Availability: Published in Annals of the New York Academy of Sciences v123 Art-2 p1220-35 Jul 15 1965. Copies to DDC users only.

Descriptors: (*Moon, Scientific research), Astronomy, Mapping, Gravity, Photographic techniques, State-of-the art reviews, Lunar probes

Selenodesy is the precise determination of the size, shape, and gravity of the moon. The purpose of this report is to briefly examine existing sources of selenodetic data in order to point out major problem areas. A further consideration of these problem areas with regard to some possible solution before 1970 is considered essential in order to evaluate the role of selenodesy and lunar gravity in lunar exploration.

3/2. ASTROPHYSICS

AD-629 842 Fld. 3/2
TEXAS UNIV AUSTIN
RELATIVISTIC ASTROPHYSICS,
by A. Schild, E. L. Schuckling, and I. Robinson.
1965, 8p. Contract AF-AFOSR-725-65, AFOSR 65-2771
Unclassified report

A report on the Second Texas Symposium.

Availability: Published in Physics Today v18 n7 p17-24 Jul 1965. Copies to DDC users only.

Descriptors: (*Astrophysics, Relativity theory), (*Relativity theory, Astrophysics), Symposia, Texas, Cosmic rays, X rays, Gamma rays, Neutrinos, Radio astronomy

The second symposium continued the discussion of quasistellar sources and reported on the progress made in the preceding year. Half of the symposium was devoted to the new maps of the sky, to x-ray, gamma-ray, and cosmic-ray astronomy, to the search for cosmic neutrinos and to the possible large-scale implications of the breakdown of CP-invariance.

AD-629 956 Fld. 3/2
CFSTI Prices: HC $4.00 MF $0.75
HARVARD COLL OBSERVATORY CAMBRIDGE MASS SOLAR DEPT
CLASSIFICATION OF SOLAR PROMINENCES FOR SUNSPOT CYCLE NO. 19-1963,
by Donald H. Menzel, and F. Shirley Jones. Jan 66, 107p. Rept. no. Scientific-6,
Contract AF19 (628)-3322, Proj. AF-7649 Task 764906,
AFCRL 66-65
Unclassified report

Descriptors: (*Solar flares, Astronomical data), (*Sun, Solar flares), Astronomical observatories, New Mexico, Astronomy

This report contains a tabulation and analysis of the behavior classification of prominences observed during 1963 at the Sacramento Peak Observatory, Sunspot, New Mexico. (Author)

AD-630 076 Fld. 3/2
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
THE COMPOSITION OF THE MARTIAN SURFACE,
by Roger A. Van Tassel, and John W. Salisbury.
Apr 65, 28p.
Unclassified report

Availability: Published in Icarus v3 p264-9 1964. Copies to DDC users only.

Descriptors: (*Mars, Surface properties), Minerals, Iron compounds, Spectroscopy, Astrophysics

It is generally believed that the desert areas of Mars are composed of limonite. This belief, which is based upon polarimetric, spectrometric, color, and albedo measurements, is in conflict with geologic reasoning. An examination of the evidence for limonite on Mars shows that the spectrometric measurements are most convincing. Laboratory experiments demonstrate, however, that the infrared emission spectra of minerals depend in part on grain size. Finely powdered minerals have infrared emission characteristic of a greybody, and yield very little spectral information. Thus, the Martian surface materials could be composed primarily of fine-grained silicates, or of coarse-grained silicates coated with finely divided limonite, without their presence being revealed spectrometrically. (Author)

AD-630 098 Fld. 3/2
PRINCETON UNIV N J DEPT OF ASTROPHYSICAL SCIENCES
THERMAL INSTABILITY IN NON-DEGENERATE STARS,
by M. Schwarzschild, and R. Harm. 3 May 65, 13p. Contract AF 49 (638)-1555, Proj. AF-9767, Task 976703,
AFOSR 66-0381
Unclassified report

Availability: Published in The Astrophysical Journal v142 n3 p855-67 Oct 1 1965. Copies to DDC users only.

Descriptors: (*Stars, Thermal stability), Astrophysics, Phase studies, Numerical analysis

In the numerical investigation of the evolution of a star of 1 solar mass through the phases in which it contains a helium-burning shell as well as a hydrogen-burning shell, an unexpected type of thermal instability has been encountered. This instability is somewhat reminiscent of the helium flash even though degeneracy plays no role in the models considered. The existence of the instability has been made reasonably certain both by a physical analysis and by a direct mathematical derivation. The new instability appears to have the character of a thermal runaway in a non-degenerate shell containing a highly temperature-sensitive nuclear-energy source. Such a shell will be unstable only if it if sufficiently thin not to affect the over-all hydrostatic structure of the star noticeably. Under this condition the pressure within the shell cannot greatly increase during the thermal runaway, and hence cooling by an adiabatic expansion cannot stabilize the shell. Some speculations are presented regarding whether this instability could have substantial consequences for a star's evolution. (Author)

AD-630 104 Fld. 3/2
YERKES OBSERVATORY WILLIAMS BAY WIS
SLIT SPECTRA OF SOME PECULIAR AND METALLIC -LINE A STARS,
by Anne Pyne Cowley, and Charles R. Cowley.
7 Feb 65, 6p.
Unclassified report

Availability: Published in Publications of the Astronomical Society of the Pacific v77 n456 p184-8 Jun 1965. Copies to DDC users only.

Descriptors: (*Stars, Spectroscopy), Astrophysics, Metals, Line spectrum

AD-630 112 Fld. 3/2
CFSTI Prices: HC $6.60 MF $0.75
LOWELL TECHNOLOGICAL INST RESEARCH FOUNDATION MASS
STUDY OF ABSORPTION AND REFRACTION CHANGES IN RADIATION EMANATING FROM JUPITER AND RADIO STARS.
Interim rept.,
by C. L. Bennett,Jr., K. Bibl, D. N. Gaunt, and B. W.Reinisch. Nov 65, 68p. Rept. no. Scientific-1,
Contract AF 19 (628)-234, Proj. AF-5629,
AFCRL 65-910
Unclassified report

Descriptors: (*Jupiter (Planet), Radio astronomy), (*Radio astronomy, Jupiter (Planet)), Radio interferometers, Extraterrestrial radio waves, Polarization, Atmospheric refraction, Magneto-optic effect, Planetary atmospheres, Atmospheric tides, Mathematical models, Astrophysics

Jupiter's radio noise has been monitored by a continuously operated sweep-frequency interferometer. The properties of the system have been studied in estimating the possible errors induced by refraction in the earth's ionosphere; the method for ray path computations which allows for refraction error estimation is described. Precise measurements of the frequency dependence of the Faraday effect upon elliptically polarized radio emissions permit the determination of the main polarization axis at the source. The coincidence of the polarization plane and Jupiter's equator supports a tide model of Jupiter's ionosphere. Jupiter's longitude and the position of its moon Io define the probability of radio noise emissions, their frequency-time behavior and to some degree their polarization character and dependence on solar cycle. These phenomena are explained by assuming a sole radio-noise source fixed at the surface of the planet and large tidal amplitudes in Jupiter's ionosphere. Energy of isotropic radio-source propagates between surface and ionosphere and escapes through a tidal density minimum which forms a 'window' in the ionosphere. (Author)

AD-630 173 Fld. 3/2
CHICAGO UNIV ILL
THE EQUILIBRIUM AND THE STABILITY OF THE RIEMANN ELLIPSOIDS. I.
Technical rept.,
by S. Chandrasekhar. 23 Apr 65, 33p. Contract Nonr-2121 (24),
Unclassified report

Availability: Published in The Astrophysical Journal v142 n3 p890-921 Oct 1 1965. Copies to DDC users only.

Descriptors: (*Ellipsoids, Stability), Equations of motion, Equations of state, Sequences, Complex variables

AD-630 174 Fld. 3/2, 20/4
CHICAGO UNIV ILL
THE POST-NEWTONIAN EQUATIONS OF HYDRODYNAMICS IN GENERAL RELATIVITY. THE POSTNEWTONIAN EFFECTS OF GENERAL RELATIVITY ON THE EQUILIBRIUM OF UNIFORMLY ROTATING BODIES. I. THE MACLAURIN SPHEROIDS AND THE VIRIAL THEOREM. THE STABILITY OF GASEOUS MASSES FOR RADIAL AND NON-RADIAL OSCILLATIONS IN THE POST-NEWTONIAN APPROXIMATION OF GENERAL RELATIVITY,
by S. Chandrasekhar. 22 Jun 65, 54p. Contract Nonr-2121 (24),
Unclassified report

Availability: Published in The Astrophysical Journal v142 n4 p1488-1540 Nov 15 1965. Copies to DDC users only.

Descriptors: (*Equations of motion, Relativity theory), (*Relativity theory, Equations of motion), Hydrodynamics, Stability, Bodies of revolution, Equations of state

AD-630 234 Fld. 3/2
CALIFORNIA UNIV BERKELEY DEPT OF ASTRONOMY
A NEW METHOD OF AUTOMATIC COMPUTATION OF STELLAR EVOLUTION,
by L. G. Henyey, J. E. Forbes, and N. L. Gould.
26 Jul 63, 15p. Rept. no. Berkeley Reprint-239,
Contract AF-AFOSR-171-63,
AFOSR 66-0374
Unclassified report

Availability: Published in The Astrophysical Journal v139 n1 p306-17 Jan 1 1964. Copies to DDC users only.

Descriptors: (*Stars, Mathematical models), Astrophysics, Programming (Computers), Numerical methods + procedures

A method is described for obtaining time sequences of stellar models describing evolutionary changes. This method is a modified version of an earlier one described by Henyey, Wilets, Bohm, LeLevier, and Levee (1959). The modifications involve the evaluation of all quantities at the same discrete points. The technique provides for coupling the interior integrations to those for model atmospheres based on mixing-length theory. The scope of the formalism is such as to provide for a wide range of calculations for spherically symmetric configurations in hydrostatic equilibrium. (Author)

AD-630 235 Fld. 3/2
CALIFORNIA UNIV BERKELEY DEPT OF ASTRONOMY
THE MIXING OF MATTER IN THE LAYER BELOW THE OUTER SOLAR CONVECTION ZONE,
by Karl-Heinz Bohm. 9 Feb 63, 7p. Rept. no. Berkeley Reprint-225,
Contract AF-AFOSR-62-199,
AFOSR 66-0375
Unclassified report

Availability: Published in The Astrophysical Journal v138 n1 p297-301 Jul 1 1963. Copies to DDC users only.

Descriptors: (*Solar atmosphere, Convection (Heat transfer)), Astrophysics, Hydrodynamics, Numerical analysis

AD-630 255 Fld. 3/2, 20/8
CFSTI Prices: HC $1.00 MF $0.50
HARVARD RADIO ASTRONOMY STATION FORT DAVIS TEX
CATALOG OF HIGH ENERGY SOLAR PARTICLE EVENTS, 1957-1961,
by P. Cummings. Dec 65, 22p. Rept. no. Scientific-7,
Contract AF 19 (628)-2370, Proj. AF-7649 Task 764906,
AFCRL 66-140
Unclassified report

Descriptors: (*Radio astronomy, Solar radiation), (*Solar radiation, Catalogs), (*Sun, Solar radiation), (*Cosmic rays, Solar radiation), Radiation measurement systems, Astronomical data, Tables

This catalog lists high energy solar particle events which occurred in the period 1957-1961. The sources of information are tables of solar particle events compiled by other authors and individual papers concerning specific solar events. A complete list of references is included. (Author)

AD-630 368 Fld. 3/2
LINCOLN LAB MASS INST OF TECH LEXINGTON
RADAR OBSERVATIONS OF METEOR DECELERATION,
by J. V. Evans. 2 Sep 65, 19p. Rept. no. ja-2451A,
Contract AF 19 (628)-5167,
ESD TDR-66-35
Unclassified report

Availability: Published in Journal of Geophysical Research v71 n1 p171-88 Jan 1 1966. Copies to DDC users only.

Descriptors: (*Meteors, Radar tracking), (*Celestial mechanics, Meteors), Deceleration, Velocity, Doppler effect, Theory, Experimental data, Correlation techniques, Astrophysics

By using a narrow-beam high-power radar operating at 68 cm it has been possible to detect meteors traveling radially toward the radar. In these observations the antenna is directed at the radiant point of an intense meteor shower, and the receiver is tuned to the expected Doppler-shifted signal. Because the actual Doppler shift can be measured with precision, both the velocity and the deceleration of the approaching meteor can be determined. The behavior of the velocity is compared with the theory for a solid particle entering the earth's atmosphere at heights where no air cap is formed. Anomalous behavior was occasionally observed, but the height at which it appears to begin is too great to be accounted for by cap formation. It is concluded that errors in the computed height of the meteor may be responsible for the anomalies. A mean value for the effective ablation energy of 15.4 sq km/sq sec was obtained, but individual meteors showed wide departures from this value. The mean mass of the meteors is estimated to be in the range 0.01 - 0.001 gram, corresponding to a visual magnitude of +5. (Author)

AD-630 449 Fld. 3/2, 20/8
RICE UNIV HOUSTON TEX DEPT OF SPACE SCIENCE
PHOTON-INDUCED BETA DECAY IN STELLAR INTERIORS,
by P. B. Shaw, D. D. Clayton, and F. C. Michel.
22 Jul 65, 10p. Contract AF-AFOSR-855-65,
AFOSR 66-0432
Unclassified report

Availability: Published in The Physical Review v140 n5B pB1433-41 Dec 6 1965. Copies to DDC users only.

Descriptors: (*Stars, Beta decay), (*Beta decay, Stars), Astrophysics, Nuclear physics, Photons, Excitation, Nuclear energy levels

Because of the astrophysical importance of beta-decay lifetimes in stellar interiors, the rate of pho-

ton-induced beta decay ('photobeta' decay) is calculated. In the photobeta process the photon can be considered to decay virtually into an electron-positron pair, with the positron being absorbed by the nucleus. The photobeta process is in competition with normal beta decay (if energetically possible), excited-state beta decay, and free-positron capture. An infrared divergence problem for exothermic photobeta decay is discussed, although the exothermic photobeta rate is too small to enhance most spontaneous beta decays. Applications are discussed in the driven decay of stable nuclei. As an example, the photobeta lifetime of a nucleus stable by 200 keV drops from 3 x 10 to the 10th power yr at 3 x 10 to the 8th power K, to 100,000 yr at 1.2 x 10 to the 9th power K for a nuclear transition matrix element characterized by log ft = 6. The competition between the photobeta process and excited-state beta decay is discussed. (Author)

AD-630 481 Fld. 3/2, 3/3
CFSTI Prices: HC $1.10 MF $0.50
NUFFIELD RADIO ASTRONOMY LABS UNIV OF MANCHESTER MACCLESFIELD (ENGLAND)
THE DETERMINATION OF THE ACCURATE POSITIONS OF RADIO SOURCES BY THE LUNAR OCCULTATION TECHNIQUE. OBSERVATIONS OF GALACTIC AND EXTRA-GALACTIC EMISSION AT 408 MC/S.
Progress rept. no. 3, Apr-Jun 65,
by Conrad H. Slater, C. G. T. Haslam, and M. J. S.Quigley. Jun 65, 6p. Contract N62558-3928,

Unclassified report

See also AD-616 927.

Descriptors: (*Radio astronomy, Galaxies), Moon, Celestial mechanics, Position finding, Extraterrestrial radio waves, Ultrahigh frequency, Stellar eclipses, Radio telescopes, Radio equipment

AD-630 482 Fld. 3/2, 3/3
CFSTI Prices: HC $1.10 MF $0.50
NUFFIELD RADIO ASTRONOMY LABS UNIV OF MANCHESTER MACCLESFIELD (ENGLAND)
THE DETERMINATION OF THE ACCURATE POSITIONS OF RADIO SOURCES BY THE LUNAR OCCULTATION TECHNIQUE. OBSERVATIONS OF GALACTIC AND EXTRA-GALACTIC EMISSION AT 408 MC/S.
Progress rept. no. 4, Jul-Sep 65,
by Conrad H. Slater, C. G. T. Haslam, and M. J. S.Quigley. Sep 65, 6p. Contract N62558-3928,

Unclassified report

See also AD-630 481.

Descriptors: (*Radio astronomy, Galaxies), Moon, Celestial mechanics, Position finding, Extraterrestrial radio waves, Ultrahigh frequency, Stellar eclipses, Radio equipment

AD-629 923 **See Fld. 17/9**

AD-629 957 **See Fld. 3/3**

AD-630 121 **See Fld. 12/1**

AD-630 236 **See Fld. 20/10**

AD-630 263 **See Fld. 20/6**

AD-630 384 **See Fld. 20/10**

AD-630 470 **See Fld. 20/6**

3/3. CELESTIAL MECHANICS

AD-629 957 Fld. 3/3, 3/2
CFSTI Prices: MF $0.50
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MECHANICAL ENGINEERING
THE FLUID DYNAMICS OF COMET DUST TAILS,
by Michael L. Finson, and Ronald F. Probstein. 1965, 21p. Rept. no. AIAA Paper-66-32, Contract Nonr-1841 (93),

Unclassified report

AIAA Aerospace Sciences Meeting (3rd) N.Y., Jan 24-26, 1966.

Availability: Available from American Institute of Aeronautics and Astronautics 1290 Ave. of the Americas, New York N. Y. 10019, HC $1.00.

Descriptors: (*Comets, Celestial mechanics), (*Celestial mechanics, Comets), Astrophysics, Extraterrestrial topography, Dust, Fluid mechanics

AD-629 882 **See Fld. 3/1**

AD-630 277 **See Fld. 20/10**

AD-630 481 **See Fld. 3/2**

AD-630 482 **See Fld. 3/2**

Field 4-ATMOSPHERIC SCIENCES

4/1. ATMOSPHERIC PHYSICS

AD-629 757 Fld. 4/1
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF RADIO AND ELECTRICAL ENGINEERING
THE CONDITION OF THE UPPER ATMOSPHERE BASED ON THE ELECTRON DENSITY PROFILES OF THE F REGION,
by Nobuo Matuura. 15 Sep 65, 32p. Rept. no. NRC-8737,
NRC 8737

Unclassified report

Availability: Published in Canadian Journal of Physics v44 p175-205 1966. Copies to DDC users only.

Descriptors: (*Upper atmosphere, Electron density), (*Electron density, Upper atmosphere), Photochemistry, Solar disturbances, Ionospheric disturbances

The upper atmospheric parameters that control the daytime electron density distributions in the F1 region have been determined with the use of N (h) profiles. The analysis is based on the photochemical equilibrium state in which ion production is given by the ionization of molecular nitrogen and/or molecular oxygen as well as of atomic oxygen, and ionization loss is controlled by charge transfer and dissociative recombination processes. The variations of the upper atmospheric parameters with season, solar activity, and magnetic disturbances have been obtained, and their relations to the upper atmospheric parameters with season, solar activity, and magnetic disturbances have been obtained, and their relations to the behavior of the F1 and F2 layers have been examined. (Author)

AD-629 922 Fld. 4/1
CFSTI Prices: HC $2.60 MF $0.50
BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD
EVIDENCE OF IONOSPHERIC INHOMOGENEITIES OVER WALLOPS ISLAND.
Memo. rept.,
by Irving Chidsey. Aug 65, 27p. Rept. no. BRL-MR-1700,
Proj. W55C0156XXA1AJ,

Unclassified report

Descriptors: (*Ionosphere, Electron density), (*Electron density, Ionosphere), (*Atmospheric sounding, Electron density), Virginia, Sounding rockets, Instrumentation, Measurement, Curve fitting

Evidence of large-scale (20 percent variation, 150 km crest-to-crest) ionospheric inhomogeneity was discovered from analysis to two-frequency beacon data obtained during a daytime, high-altitude rocket flight at Wallops Island, Virginia, although similar flights 8 months earlier and 12 hours later provided inconclusive beacon data. Evidence of the inhomogeneity was also obtained from series of ionograms recorded concurrently with the first two flights, but not with the third. A digital ray tracing program was successfully used in reducing the data. (Author)

AD-629 986 Fld. 4/1, 14/2
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
COMPARISON OF CHEMILUMINESCENT AND ELECTROCHEMICAL OZONESONDE OBSERVATIONS,
Instrumentation papers (Revised ed.),
by W. S. Hering, and H. U. Dutsch. 11 Aug 65, 12p. Rept. no. AFCRL-IP-89,AFCRL-66-47
Proj. AF-8631, Task 863102,

Unclassified report

Revision of manuscript submitted 3 Jun 65.

Availability: Published in Journal of Geophysical Research v70 n22 p5483-90 Nov 15 1965. Copies to DDC users only.

Descriptors: (*Ozone, Measurement), (*Atmospheric sounding, Ozone), (*Radiosondes, Atmospheric sounding), Chemiluminescence, Electrochemistry, Meteorological instruments, Performance (Engineering)

The performance characteristics of the electrochemical and chemiluminescent ozonesondes were investigated through analysis of comparative ascents. A direct intercomparison of short duration was made at Boulder, Colorado, in October 1964. Further comparison was obtained by analysis of ascents made on the same day on many individual days using the electrochemical instrument at Boulder, Colorado, and the chemiluminescent instrument at Fort Collins, Colorado. Good agreement was found between the two methods of ozone measurement. Observed differences in the comparative profiles obtained in the October test series were generally within a few nanobars partial pressure. Similar results were obtained from the Boulder-Fort Collins data comparison. However, this analysis confirmed the fact that a correction is required for a systematic loss of sensitivity with time in the chemiluminescent-type sonde ascents in the winter and spring of 1963-1964. (Author)

AD-629 989 Fld. 4/1
CFSTI Prices: HC $2.00 MF $0.50
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
MEAN DISTRIBUTIONS OF OZONE DENSITY OVER NORTH AMERICA, 1963-1964.
Environmental research papers,
by Wayne S. Hering, and Thomas R. Borden Jr.,
Dec 65, 28p. Rept. no. AFCRL-ERP-162, AFCRL-65-913
Proj. AF-8631, Task 863102,

Unclassified report

Descriptors: (*Ozone, Atmosphere), North America, Distribution, Atmospheric sounding, Density

An interim summary of the ozone climate over North America has been prepared from AFCRL ozonesonde network observations made during 1963 and 1964 (AD-435 873, -604 880, -623 018). Mean bimonthly distributions of ozone density computed for individual network stations depict the average ozone structure as a function of altitude and season for the first two years of network

operation. Data are also presented on the standard deviation of ozone density and the mean seasonal distributions along a meridional cross section extending from the Canal Zone to Greenland. A brief statistical analysis indicates that approximately 35 to 50 percent of the variance in the total ozone amount at middle and high latitudes is given by the fluctuations in ozone density in the 11- to 13-km or 13- to 15-km layers. (Author)

AD-629 996 Fld. 4/1
CFSTI Prices: HC $16.10 MF $1.00
BOLT BERANEK AND NEWMAN INC CAMBRIDGE MASS
STUDY DIRECTED TOWARD OPTIMIZATION OF OPERATING PARAMETERS OF THE EMAC PROBE FOR THE REMOTE MEASUREMENT OF ATMOSPHERIC PARAMETERS.
Final rept.,
by Clayton H. Allen, and Stephen D. Weiner.
Sep 63, 165p. Contract AF 19 (628)-2774, Proj. AF-6672, Task 667205,
AFCRL 63-596

Unclassified report

Descriptors: (*Operations research, Atmospheric sounding), (*Atmospheric sounding, Optimization), Acoustics, Probes (Electromagnetic), Radar reflections

The concept of utilizing sound waves as reflectors for pulsed Doppler radar as a means for measuring wind velocity, turbulence, and air temperature has been examined theoretically. Any extension of the initial and successful, small scale experiments performed by Midwest Research Institute to a practical system for atmospheric probing is shown to require a change in the operating concept of the acoustic system. This change involves the abandoning of the concept of coherent reflection reinforcement from a multiple wave train and the substitution of reflection from a single acoustic shock front with the introduction of coherent integration of the pulsed Doppler radar signal. A preliminary experimental approach to a practical system is proposed. (Author)

AD-630 020 Fld. 4/1
IOWA UNIV IOWA CITY DEPT OF PHYSICS AND ASTRONOMY
FRACTIONAL CONCENTRATION OF HYDROGEN IONS IN THE IONOSPHERE FROM VLF PROTON WHISTLER MEASUREMENT,
by Stanley D. Shawhan, and Donald A. Gurnett.
6 Aug 65, 13p. Contract Nonr-1509 (06),

Unclassified report

Availability: Published in Journal of Geophysical Research v71 n1 p47-59 1 Jan 1966. Copies to DDC users only.

Descriptors: (*Ionosphere, Hydrogen), (*Hydrogen, Ionosphere), (*Atmospheric sounding, Whistlers), (*Whistlers, Very low frequency), Ions, Distribution, Measurement, Scientific satellites

AD-630 094 Fld. 4/1
CFSTI Prices: HC $5.60 MF $0.50
STANFORD RESEARCH INST MENLO PARK CALIF
THE IONOSPHERE BELOW 100 KM (D-REGION) A SIMPLE MODEL.
Research memo.,
by H. R. Arnold, and E. T. Pierce. Sep 63, 55p. Rept. no. RM-11,
Contract DA-36-039-sc-87197, Proj. SRI-3670,

Unclassified report

Descriptors: (*Ionosphere, Mathematical models), (*Atmosphere models, Ionosphere), Photochemistry, Solar radiation, Cosmic rays, Gas ionization, Atmosphere, Geophysics

The parameters involved in the formation of the D region of the ionosphere are discussed in detail in an attempt to deduce the most reasonable values for them given our present knowledge of the ionosphere at heights of 40-100 km. The ionization due to solar radiation and from other sources, chiefly cosmic radiation, is also discussed and a model that includes the effect of solar cycle variations is derived. Several calculations, using the suggested values for the parameters, are made, including a comparison to an experimental profile for which the agreement is found to be remarkably good. Finally, mention is made of possible stratification due to winds and turbulence at D-region heights. (Author)

AD-630 117 Fld. 4/1, 20/6
CFSTI Prices: HC $2.00 MF $0.50
CHEMICAL RESEARCH AND DEVELOPMENT LABS EDGEWOOD ARSENAL MD
THE APPARENT DEPENDENCE OF TERRESTRIAL SCINTILLATION INTENSITY UPON ATMOSPHERIC HUMIDITY.
Rept. for Sep 63-Mar 65,
by Hugh R. Carlon. Nov 65, 35p. Rept. no. CRDLR-3324,
Proj. DA-1B643606D612,

Unclassified report

Descriptors: (*Scintillation, Infrared radiation), (*Aerosols, Scintillation), (*Humidity, Scintillation), (*Atmospheric refraction, Humidity), Light transmission, Atmosphere, Refractive index, Water vapor, Absorption spectrum

Observations indicate a direct relationship between terrestrial scintillation intensity and relative humidity (RH). A developed theory supplementing air-refractive and diffractive treatments attributes this increased modulation intensity to water droplets formed either gradually or instantaneously at 70% RH or higher. Modulation at visible wavelengths is attributed to scattering, while spectral absorption causes far-infrared-wavelength modulation. The report contains limited experimental substantiation of this theory. A comparative discussion of atmosphere opacity at far-infrared wavelengths (10-micron region) under high- and low-humidity conditions is presented. An empirical equation for determination of the 'scintillation intensity index' is presented, with graphical presentations of conclusions. (Author)

AD-630 126 Fld. 4/1, 20/14, 22/2
CFSTI Prices: HC $13.60 MF $1.00
UTAH UNIV SALT LAKE CITY UPPER AIR RESEARCH LABS
DETERMINATION OF THE ELECTRON DENSITY IN THE IONOSPHERE BY THE PULSE DELAY TECHNIQUE.
Final rept. 2 Feb 62-31 Mar 65,
by Kay D. Baker, and Glen D. Allred. Mar 66, 132p. Rept. no. UU-66-1,
Contract AF 19 (628)-352, Proj. AF-7663, Task 766303,
AFCRL 66-55

Unclassified report

Descriptors: (*Ionosphere, Electron density), (*Electron density, Ionosphere), (*Atmospheric sounding, Electron density), Sounding rockets, Pulse transmitters, Radio waves, Ionospheric propagation, Multipath transmission, Phase distortion, Phase measurement

Rocketborne pulse-delay and pulse-phase experiments were developed to measure integrated free electron density between a rocket operating in the ionosphere and stations on the earth's surface. Electron density is related to the group delay and phase velocity of transmitted signals, and is attained by measuring these parameters. The transit time and phase velocity of probing signals near the critical frequency of the layer of ionosphere under investigation, are compared with those of a reference signal which suffers negligible effects during transit. Three rockets were instrumentated with upward transmission pulse delay experiments and launched, and a fourth, instrumented with a downward pulse-phase delay experiment, was brought to a state of near readiness. A miniature, rocketborne system has resulted which is capable of yielding parameters related to electron density. While of limited value in a highly disturbed ionosphere, the experiment is a valuable source of data in an undisturbed medium. (Author)

AD-630 139 Fld. 4/1
UNIVERSITY COLL DUBLIN (EIRE)
DETECTION OF RADIO PULSES FROM EXTENSIVE AIR SHOWERS, WITH A WIDE-BAND RECEIVING SYSTEM,
by N. A. Porter, C. D. Long, B. McBreen, D. J. B. Murnaghan, and T. C. Weekes. 1 Nov 65, 5p.
Contract AF-EOAR-80-63,
AFOSR 66-0455

Unclassified report

Availability: Published in Physics Letters v19 n5 p415-7 Nov 15 1965. Copies to DDC users only.

Descriptors: (*Cosmic ray bursts, Radio waves), (*Atmospherics, Cosmic ray bursts), Extraterrestrial radio waves, Broadband, Radio receivers

AD-630 142 Fld. 4/1, 20/14, 22/2
CFSTI Prices: HC $1.00 MF $0.50
NAVAL RESEARCH LAB WASHINGTON D C
IONOSPHERIC PARAMETERS DERIVED FROM ECHO II RADAR RETURNS DURING SOLAR MINIMUM CONDITIONS.
Interim rept.,
by John M. Goodman. 21 Feb 66, 22p. Rept. no. NRL-6375,
Proj. RF-001-02-41-4001,

Unclassified report

Descriptors: (*Radar reflections, Atmospheric sounding), (*Atmospheric sounding, Magneto-optic effect), (*Magneto -optic effect, Atmospheric sounding), (*Ionosphere, Electron density), Satellites (Artificial), Radar reflectors, Radar signals, Ionospheric propagation, Correlation techniques

Radar returns from the Echo II satellite (1964-4A) were analyzed for Faraday rotation effects in order to ascertain their utility in deducing both the subsatellite electron content and the equivalent slab thickness of the daytime ionosphere. The following conclusions were reached: (a) The subsatellite electron content generally exhibits a large variance, but its average value tends to be largest near midday and decreases with increasing solar zenith angle. (b) The daily equivalent slab thickness exhibits no marked variation between 0800 and 1800 EST, although midafternoon values are somewhat in excess of prenoon values. (c) The seasonal equivalent slab thickness has its minimum in local winter and its maximum in local summer; the equinox values are intermediate, with the autumnal equinox exhibiting higher computed values than the vernal equinox period. (d) The mean scale height Hs and the mean neutral gas temperature T for the ionosphere were found to be 94 km and 1582 K, respectively, during daytime hours. The daytime ionosphere was found to be 500 K warmer in summer than in winter, with the mean equinox temperature being close to the all-season average. (e) No pronounced correlation with Zurich sunspot number of decimetric solar flux was discernible, which was probably due to the fact that statistical variations in the observations exceeded the real variations which might have occurred as a result of solar activity changes. (f) No correlation with the magnetic index K was noted. These conclusions are based on radar echo data obtained during the recent period of minimum solar activity. (Author)

AD-630 182 Fld. 4/1, 20/8
CFSTI Prices: HC $1.00 MF $0.50
DOUGLAS AIRCRAFT CO INC SANTA MONICA CALIF MISSILE AND SPACE SYSTEMS DIV
DETERMINATION OF SOLAR PROTON ENERGY SPECTRUMS BELOW 100 MEV FROM GROUND-BASED MEASUREMENTS,

by G. W. Adams, and A. J. Masley. Feb 66, 20p. Rept. no. SM-51974,

Unclassified report

Descriptors: (*Protons, Solar radiation), (*Solar radiation, Protons), (*Cosmic rays, Protons), Electron density, Ionospheric disturbances, Solar disturbances, Correlation techniques, Space environmental conditions

A technique is presented for calculating solar proton energy spectrums from electron density profiles measured during solar cosmic ray events. The electron density profile is converted to an electron-ion pair production rate profile, and the spectrum determined by using the proton range-energy relations. This technique is applied to seven electron density profiles determined with multifrequency riometers in the July 1961 solar cosmic ray events, and the resulting spectrums are compared to satellite measurements. Coupling this method of calculation with the multifrequency riometer technique for determining electron density profiles gives a means of determining solar proton energy spectrums entirely from ground-based measurements. (Author)

AD-630 183 Fld. 4/1, 20/8
CFSTI Prices: HC $1.00 MF $0.50
DOUGLAS AIRCRAFT CO INC SANTA MONICA CALIF MISSILE AND SPACE SYSTEMS DIV
COMMENTS ON SOLAR ALPHA-PARTICLE CONTRIBUTIONS TO RIOMETER MEASUREMENTS.
Space physics and planetary sciences,
by G. W. Adams, and A. J. Masley. Feb 66, 14p. Rept. no. SM-51997,

Unclassified report

Descriptors: (*Solar radiation, Alpha particles), (*Alpha particles, Solar radiation), (*Cosmic rays, Alpha particles), Alpha particle detectors, Riometers, Solar disturbances, Ionospheric disturbances, Correlation techniques, Space environmental conditions

In a recent publication, Weir and Brown (J. Geophys. Res., 69 (11), 2193-2198, 1964) calculated the effects of solar protons and a particles on riometers and concluded that, in cases where the alpha-proton ration is close to unity, 'the particles are responsible for more than 75 per cent of the ionospheric absorption,' and that 'solar a particle event' might be a more appropriate expression than 'solar proton event.' The purpose of this comment is to point out that their conclusions are the result of their choice of geomagnetic cutoff, that this cutoff is unrealistic from the standpoint of normal riometer work, and that solar alpha-particle dominance is rarely, if ever, observed. (Author)

AD-630 215 Fld. 4/1
PITTSBURGH UNIV PA
IONOSPHERIC REACTION RATES IN THE LIGHT OF RECENT MEASUREMENTS IN THE IONOSPHERE AND THE LABORATORY.
Technical rept.,
by T. M. Donahue. 9 Aug 65, 17p. Rept. no. TR-20,
Contract Nonr-624 (06) ,NASR-179

Unclassified report

Availability: Published in Planetary and Space Science v14 p33-48 1966. Copies to DDC users only.

Descriptors: (*Ionosphere, Reaction kinetics), Ions, Molecules, Recombination reactions, Ion exchange, Dissociation, Mass spectroscopy

An attempt is made to obtain a set of ion-molecule reaction rates and recombination coefficients consistent with recent mass spectrometric data obtained between 120 and 220 km.

AD-630 293 Fld. 4/1, 14/2
CFSTI Prices: HC $5.00 MF $1.00
UNIVERSITY OF WESTERN ONTARIO LONDON DEPT OF PHYSICS
INVESTIGATION OF REFRACTOMETER MEASUREMENTS IN THE ATMOSPHERE AT HIGH RELATIVE HUMIDITIES AND TEMPERATURES.
Final rept.,
by D. R. Hay, and H. E. Turner. Jul 63, 160p.
Contract AF 19 (628)-444, Proj. AF-6682,ES-2-GEN-509-6 Task 668202,
AFCRL 63-631

Unclassified report

Descriptors: (*Refractometers, Atmospheric sounding), (*Humidity, Atmospheric refraction), (*Atmospheric refraction, Humidity), Refractive index, Troposphere, Adsorption, Water vapor, Microwave equipment, Calibration, Wind tunnels

Two techniques for the precise measurement of changes in air refractivity within the troposphere are examined in the present study. These are the microwave refractometer which uses a ventilated metal cavity as the sensing element, and the Hay refractometer whose sensing element is in air capacitor. The effects of water vapour adsorption and condensation upon the sensing elements of these instruments at high relative humidities make the interpretation of such soundings uncertain, in view of the conflicting evidence of previous workers. This report describes a laboratory study of the interaction between the refractometer sensors and the air humidity.

AD-630 387 Fld. 4/1, 20/8
FALKINER NUCLEAR DEPT UNIV OF SYDNEY (AUSTRALIA)
THE DENSITY SPECTRUM OF AIR SHOWERS AT SEA LEVEL AND MOUNTAIN ALTITUDES,
by J. B. T. McCaughan, C. B. A. McCusker, S. H.Seet, R. H. Wand, and B. O'Donnell. 15 Jan 65, 13p. Contract AF-AFOSR-62-410, Proj. AF-9751, Task 975104,
AFOSR 66-0037

Unclassified report

Prepared in cooperation with Alberta Univ., Edmonton. Dept. of Physics.

Availability: Published in Nuovo Cimento (SX) v38 p697-706 Jul 1965. Copies to DDC users only.

Descriptors: (*Cosmic ray bursts, Electron density), (*Nuclear physics, Cosmic ray bursts), Troposphere, Charged particles, Radiation measurement systems, Cloud chambers

The cosmic-ray differential density spectrum in the range 3 to 10000 p/sq. m has been obtained, using Wilson cloud chambers, at sea level and at 2285 m a.s.l. In neither case can the whole spectrum be fitted by a single power law. Using a three-parameter fit the sea-level spectrum is best approximated by two power laws of exponents --2.491 plus or minus 0.036 and --3.42 plus or minus 0.32, respectively, joining at 560 plus or minus 180 particles per square metre. At 2285 m a.s.l. the three best parameters are --2.431 plus or minus 0.015, --4.8 (exponents + 1.3-0.8) and 6000 (exponents +1000-800) particles per square metre. The change with altitude supports the hypothesis that the change in exponent is due to a steepening of the primary cosmic-ray energy spectrum. (Author)

AD-629 756 See Fld. 22/2

AD-629 923 See Fld. 17/9

AD-629 924 See Fld. 20/9

AD-629 985 See Fld. 8/14

AD-630 017 See Fld. 7/4

AD-630 091 See Fld. 9/5

AD-630 192 See Fld. 20/14

AD-630 339 See Fld. 7/4

4/2. METEOROLOGY

AD-629 933 Fld. 4/2
CFSTI Prices: HC $20.20 MF $1.25
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
THE CUMULUS AND METEOROLOGICAL EVENTS OF THE FLORIDA PENINSULA DURING A PARTICULAR SUMMERTIME PERIOD. CLOUD REFRACTIVE INDEX STUDIES IIIA.
Interim scientific rept., environmental research papers,
by Vernon G. Plank. Oct 65, 203p. Rept. no. AFCRL-ERP-151,AFCRL-65-761
Proj. AF-8620,AF-5930 Task 862006 ,593007

Unclassified report

Descriptors: (*Meteorology, Florida), (*Cumulus clouds, Florida), Aerial photography, Weather forecasting, Meteorological parameters

The cumulus cloud events of the Florida peninsula that were observed during a 19-day period of photoreconnaissance in August and September 1957 are described and illustrated. The associated meteorological and rainfall events are also described and the intercorrelations among the various observations are pointed out.<The study findings revealed that the principal factors governing the cloud and rainfall situations of the different days were (1) the low-level advection of water vapor into the peninsula from the oceanic surroundings, (2) the wind transport, into the heated peninsula from the oceans during the daytime, of pre -existing cumulus populations containing appreciable liquid water, (3) the low-level convergence, and associated updraft motion, engendered by the synoptic situation and the peninsula sea breezes, and (4) the precipitable water content of the lower Florida air mass. (Author)

AD-629 952 Fld. 4/2
CFSTI Prices: HC $4.60 MF $0.50
MIAMI UNIV CORAL GABLES FLA INST OF MARINE SCIENCE
MESOSCALE STUDIES OF INSTABILITY PATTERNS AND WINDS IN THE TROPICS.
Semi-annual rept. no. 1, 1 Jun-30 Nov 65,
by Harold P. Gerrish, and Homer W. Hiser. Feb 66, 44p. Rept. no. 10,
Contract DA-28-043-AMC-00443 (E) Proj. DA-IVO-14501-B-53A-09-07,

Unclassified report

Descriptors: (*Meteorology, Florida), (*Meteorological radar, Weather forecasting), (*Weather forecasting, Meteorological radar), Atmospheric refraction, Storms, Rainfall, Wind, Tropical regions

Atmospheric refractive and temperature conditions associated with moist season tornado, waterspout, and hail systems in South Florida are surveyed using routine radiosonde soundings from Miami Airport. Rain camera data are used to provide cursory information on rainfall rates in easterly wave and air mass showers at the University of Miami. A general description of recent modifications made on radar equipment at the University is presented. Brief comments are made about two remarkable rainstorms that produced 24-hour rainfall amounts on the order of 20 inches or more in essentially the same portion of the Lower East Coast of Florida in October 1965. (Author)

AD-629 988 Fld. 4/2, 17/9
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
WIND MEASUREMENT BY CONVENTIONAL RADAR WITH A DUAL BEAM PATTERN.
Instrumentation papers (Revised ed.),
by David Atlas, and Raymond Wexler. 27 May

65, 14p. Rept. no. AFCRL-IP-90,AFCRL-66-61
Proj. AF-6672, Task 667205,
Unclassified report

Revision of manuscript submitted 11 Jan 65. Prepared in cooperation with ARACON Geophysics Co., Concord, Mass.

Availability: Published in Journal of Applied Meteorology v4 n5 p598-606 Oct 1965. Copies to DDC users only.

Descriptors: (*Wind, Measurement), (*Meteorological radar, Multipath radar), Atmospheric motion, Doppler effect, Correlation techniques

A method of measuring wind velocities by a dual beam modification to conventional (non-Doppler) radars is described. The two beams are disposed slightly to either side of the antenna bore-sight axis. This results in a double-peaked Doppler velocity (frequency) spectrum which is centered on the radial velocity component and whose peaks are spaced proportionally to the transverse velocity component. Such a dual beam Doppler radar is therefore able to measure the complete vector velocity. But the conventional radar can measure only the echo fluctuation spectrum. For any Doppler spectrum, there is a unique fluctuation spectrum, and in the case of the double peaked Doppler spectrum, the fluctuation spectrum has a secondary peak at a frequency corresponding to the peak spacing. Thus, the conventional radar can also measure the transverse velocity component. While spectrum contamination by turbulence and wind shear may cause the peaks to blend with one another, it is shown that the variance of the fluctuation spectrum for the dual beam mode minus that of the single beam is nevertheless uniquely related to transverse target velocity. Various applications to meteorology are described. The techniques are also directly applicable to the measurement of aircraft ground velocity using airborne radars. (Author)

AD-630 073 Fld. 4/2, 22/2, 14/2
TEXAS UNIV AUSTIN
THEORETICAL TIME CONSTANT AND RADIATION ERROR OF A ROCKETSONDE THERMISTOR.
Revised ed.,
by N. K. Wagner. 27 Mar 61. 10p. Contract DA-23-072-ORD-1564,
Unclassified report

Revision of manuscript submitted 12 Jan 61.

Availability: Published in Journal of Meteorology v18 n5 p606-14 Oct 1961. Copies to DDC users only.

Descriptors: (*Sounding rockets, Thermistors), (*Thermistors, Sounding rockets), (*Atmospheric sounding, Thermistors), Meteorological instruments, Time, Errors, Calibration

The time constant for a ten-mil-diameter, spherical bead thermistor is determined as a function of height in a standard atmosphere from sea level to 100 km. Evaluations are made for continuous, slip, and freemolecular flow conditions with the transition from one flow regime to another being a function of sensor size and the mean free path length of the air molecules. The ventilation speed of the sensor is dictated by the fall velocity of the parachute from which the element is suspended. Computed values for the time constant are 0.32 sec at sea level, 0.62 sec at 25 km, 2.0 sec at 50 km, 70 sec at 80 km and 720 sec at 100 km. A discussion of the errors which might be contained in these determinations is also given. These results are then used in computations of the radiation error of the thermistor from sea level to 100 km. Variations in the radiation error which result from changes in various physical parameters of the sensor and its environment are also shown in the 20 to 60 km altitude interval. It is concluded that this sensor should generally provide temperature information which is accurate to plus or minus 5C up to about 55 km with no correction necessary. Above this level, corrections to the measured temperature are necessary because of possible variations in the physical parameters of the sensor and its environment. The magnitude of these corrections becomes quite uncertain above 65 or 70 km. (Author)

AD-630 110 Fld. 4/2
CFSTI Prices: HC $1.60 MF $0.50
WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS
METEOROLOGICAL STUDIES CONDUCTED BY CONTRACT NONR-4071 (00).
Final rept.,
by Claude Ronne. Feb 66, 11p. Rept. no. WHOI-Ref-66-5,
Contract Nonr-4071 (00)
Unclassified report

Descriptors: (*Artificial precipitation, West Indies), (*Photography, Meteorology), Marine meteorology, Caribbean Sea, Islands, Mountains, Thermodynamics, Cumulus clouds, Injection, Silver compounds, Iodides

Weather modification Studies as Recorded Photographically. During April and August 1963 the Barbados Weather Modification Project made extensive use of whole -sky, time-lapse and conventional photography to investigate cloud and rain formation over tropical heat sources. These observations were made from land-based, ship -borne and aircraft stations. In July 1965 further photographic studies were carried out over the eastern Caribbean Sea to evaluate the effect of seeding cumulus clouds with silver iodide bombs. (Author)

AD-630 200 Fld. 4/2
CFSTI Prices: HC $5.00 MF $1.00
DAYTON UNIV OHIO RESEARCH INST
DEVELOPMENT OF METHODS TO DETERMINE WINDS, DENSITY, PRESSURE, AND TEMPERATURE FROM THE ROBIN FALLING BALLOON.
Final rept. Nov 60-Apr 65,
by Nicholas A. Engler. May 65, 159p. Rept. no. udri-TR-66-101,
Contract AF 19 (604)-7450, Proj. AF-6682, Task 668203,
AFCRL 65-448
Unclassified report

Descriptors: (*Meteorological balloons, Radar tracking), (*Radar tracking, Meteorological balloons), Meteorological parameters, Programming (Computers), Numerical analysis, Least squares method

The 'March 1965 ROBIN Program' written to obtain meteorological parameters from radar tracking data only is presented. The errors in the resulting data are derived and analyzed. A least square technique, evaluated by data from dual radar tracked flights, is used to smooth the coordinate data and, hence, to determine the most likely velocity and acceleration. The resulting meteorological data is found to be accurate within plus or minus 6 knots for winds at the high (60 km) altitude and plus or minus 3 knots for winds at the low (35 km) altitude. For density and temperature, accuracy is within 6% and 10%, respectively, for the high altitude and 3% and 14%, respectively, for the low altitude. Meteorological parameters from several flights found by the use of the computer program are discussed. (Author)

AD-630 289 Fld. 4/2
CFSTI Prices: HC $2.00 MF $0.50
ENVIRONMENTAL TECHNICAL APPLICATIONS CENTER (AIR FORCE) WASHINGTON D C
ESTIMATING MEAN CLOUD AND CLIMATOLOGICAL PROBABILITY OF CLOUD-FREE LINE-OF-SIGHT,
by John T. McCabe. Nov 65, 31p.
AWS TR-186
Unclassified report

Descriptors: (*Cloud cover, Mathematical prediction), (*Climatology, Cloud cover), Meteorology, Clouds, Distribution, Probability, All-weather aviation, Visibility, Aerial reconnissance, Aerial photography

A method is described which provides an estimate of the probability of cloud-free line-of-sight between any two levels at any angle to the horizon for locations having standard surface-observed cloud data. The method uses the mean cloud amount between the surface and each higher kilometer level to estimate the mean cloud amount at any level, the mean cloud amount above any level and the mean cloud amount between any two levels. Analyses of sunshine and total cloud cover by time of day provide a basis for estimating probability of cloud-free line-of-sight through the whole atmosphere as a function of mean total cloud cover and viewing angle. This relationship is used to estimate the probability of cloud-free line-of-sight at any angle between any two levels for which the mean cloudiness between the levels is known or estimated. Height vs distance profiles of estimated probability of cloud-free line-of-sight can be prepared manually or by computer for any kilometer height reference levels. (Author)

AD-630 296 Fld. 4/2
CFSTI Prices: HC $1.10 MF $0.50
DEPARTMENT OF TRANSPORT TORONTO (ONTARIO) METEOROLOGICAL BRANCH
MEAN SEA LEVEL PRESSURE NORMALS.
7 Mar 66, 7p. Rept. no. CDS-1-66,
Unclassified report

Descriptors: (*Climatology, Canada), (*Barometric pressure, Climatology), (*Canada, Climatology), Meteorological parameters, Statistical data, Tables

Monthly and annual mean sea level pressure normals are shown on tables for all Canadian weather stations with an appreciable length of record over the period 1941 to 1960. The values listed are generally based on at least ten years of observed data. However, shorter records have been used in a few instances where it is important that a provisional normal be established. At some stations the established elevation of the station was in error during the early part of the record and it has been necessary to apply corrections to the data to bring them into uniformity with surrounding stations. In each case a code number is given which indicates the way in which these normals have been calculated. It is planned to publish these pressure normals in a booklet with other climatological parameters at a later date and this preliminary listing provides an opportunity to apply any needed editorial corrections. Users of these data are therefore urged to advise Meteorological Branch Headquarters of any errors or omissions. The mean sea level pressure data are expressed in millibars. (Author)

AD-630 356 Fld. 4/2
DEPARTMENT OF TRANSPORT TORONTO (ONTARIO) METEOROLOGICAL BRANCH
CANADIAN UPPER AIR DATA.
Monthly bull.
Sep 65, 100p.
Unclassified report

Availability: Available from Department of Transport, Ottawa (Ontario). Meteorological Branch, $5.00 per yr. $0.50 per issue.

Descriptors: (*Meteorology, Canada), (*Canada, Meteorological parameters), (*Climatology, Canada), Tables, Atmospheric sounding

AD-630 439 Fld. 4/2, 9/2
CFSTI Prices: HC $15.70 MF $1.00
CALIFORNIA UNIV LOS ANGELES DEPT OF ENGINEERING

APPLICATION OF A RESTRUCTURABLE COMPUTER SYSTEM TO NUMERICAL WEATHER PREDICTION COMPUTATIONS,
by Gary R. Wood. Feb 66, 161p. Rept. no. 66-14,
Contract Nonr-233 (52);AT (11-1)-GEN-10 Proj. 14,
Unclassified report

Descriptors: (*Weather forecasting, Programming (Computers)), (*Programming (Computers), Weather forecasting), Meteorological parameters, Mathematical prediction, Digital computers, Compilers, Control sequences, Systems engineering

The restructurable computer system consists of a fixed computer (F) plus a variable structure (V) which work cooperatively toward the solution of a problem. The variable structure utilizes a variety of highspeed computing modules which may be interconnected to form a highly parallel, problem-oriented special-purpose computer. The first step in the investigation was a detailed analysis of the numerical weather prediction program to determine the basic algorithms and the characteristics of the problem which might require special attention. The iterative nature of the program and the fact that calculations at each grid point are independent of each other and require access to data describing only a small neighborhood of grid points led to the development of a special memory buffer. This type of memory allows parallel access to 25 data words and provides a means of rapidly advancing calculations from one grid point to the next. A timing analysis of the proposed system was conducted utilizing a computer program called the 'Automatic Assignment Routine' which assumed the availability of from one to four IBM 7090 arithmetic units for use as computing modules in V. This analysis showed that the F + V system could be expected to produce a speed advantage of about three to one over a standard IBM 7094 system. (Author)

AD-630 460 Fld. 4/2, 14/2
CFSTI Prices: HC $7.00 MF $1.50
IIT RESEARCH INST CHICAGO ILL
EXPERIMENTAL FEASIBILITY STUDY OF REMOTE MICROWAVE MEASUREMENTS OF ATMOSPHERIC TEMPERATURE.
Final rept., 1 Apr 64-31 Dec 65,
by David Fryberger. 31 Dec 65, 319p. Rept. no. E6016,
Contract AF 19 (628)-4022, Proj. AF-6672, Task 667205,
AFCRL 66-93
Unclassified report

Descriptors: (*Atmospheric temperatures, Measurement), (*Radiometers, Atmospheric sounding), (*Atmospheric sounding, Radiometers), Temperature inversion, Height finding, Microwave equipment, Meteorological parameters, Curve fitting, Feasibility studies

This report discusses the problem of deducing a profile of atmospheric temperature versus height from an empirically measured profile of integrated radiometer temperature versus elevation angle. The basic radiometer equation is derived and several mathematical techniques for inverting it are discussed. The sources of errors are enumerated, and a quantitative analysis of the propagation of these errors through this inversion process has been done. The relative magnnitude of the resultant errors is given. These results indicate that there are very serious error problems associated with this technique for the measurement of atmospheric temperature. These difficulties indicated by the results of the theoretical study were substantiated by the inversion of four sets of actual radiometric temperature data. (Author)

AD-630 513 Fld. 4/2
LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE (ENGLAND) DEPT OF GEOGRAPHY
THE VERTICAL PROFILE OF WIND AT LAKE HAZEN, N.W.T.,
by C. I. Jackson. 1965, 15p.
Unclassified report

Availability: Published in Arctic, Journal of the Arctic Institute of North America v18 n1 p21-35 Mar 1965. Copies to DDC users only.

Descriptors: (*Wind, Ellesmere Island), (*Ellesmere Island, Wind), (*Climatology, Ellesmere Island), Micrometeorology, Atmospheric sounding, Lakes, Arctic regions

AD-629 977 See Fld. 8/12

AD-630 431 See Fld. 8/3

Field 5-BEHAVIORAL AND SOCIAL SCIENCES

5/1. ADMINISTRATION AND MANAGEMENT

AD-629 914 Fld. 5/1, 13/13, 5/9
CFSTI Prices: HC $8.60 MF $0.75
AMERICAN INSTITUTES FOR RESEARCH PITTSBURGH PA INST FOR PERFORMANCE TECHNOLOGY
INTEGRATED GUIDANCE FOR SHELTER MANAGEMENT. THE SELECTION AND RECRUITMENT OF SHELTER MANAGERS.
Technical rept.,
by Robert W. Smith, and Frank B. Jeffreys. Jun 65, 87p. Rept. no. AIR-D93B-6/65-TR (a-1),
Contract OCD-PS-64-57, Proj. 1533A,
Unclassified report

Descriptors: (*Fallout shelters, Management engineering), (*Management engineering, Fallout shelters), (*Civil defense personnel, Personnel management), Selection, Recruiting, Civil defense systems, Instruction manuals, Effectiveness

The development, field-verification, and revision of guidance materials for the selection and recruitment of shelter managers suitable for use by local civil defense personnel was the purpose of the project. The scope of existing guidance was reduced by eliminating both the training guidance and the discussion of the supporting methodology. A sample of ten representative communities was selected to use the guidance to implement a selection and recruitment program. Data collected included: previous selection and recruitment efforts, comments on the materials, effectiveness of selection and recruitment programs implementing the guidance, and information on the community. Although response to the principles was favorable, considerable difficulty was encountered in convincing the local civil defense personnel to use personal contact in selection and recruitment. In those communities where the guidance was applied, the results indicated that the Guide's recommended methods are superior to the more traditional method of general requests for volunteers. Further verification of the guidance was gained from observing a pilot recruitment program conducted by Region, state, and local civil defense workers in a Western city. (Author)

AD-629 915 Fld. 5/1, 13/13, 5/9
CFSTI Prices: HC $1.10 MF $0.50
AMERICAN INSTITUTES FOR RESEARCH PITTSBURGH PA INST FOR PERFORMANCE TECHNOLOGY
INTEGRATED GUIDANCE FOR SHELTER MANAGEMENT. THE SELECTION AND RECRUITMENT OF SHELTER MANAGERS.
Summary technical rept.,
by Robert W. Smith, and Frank B. Jeffreys. Jun 65, 6p. Rept. no. AIR-D93B-6/65-TR (a-11),
Contract OCD-PS-64-57,
Unclassified report

Descriptors: (*Fallout shelters, Management engineering), (*Management engineering, Fallout shelters), (*Civil defense personnel, Personnel management), Selection, Recruiting, Civil defense systems, Instruction manuals, Effectiveness

The guidance materials for selection and recruitment that were verified and evaluated during this study were based upon portions of the A.I.R report, 'The Recruitment, Selection, and Training of Shelter Managers and Core Staffs' (Eninger and Fetter, 1963). That report was modified in a number of ways for application to actual shelter situations. The critical comments indicated that most of the reviewers felt that (1) the Guide was applicable to both the reviewer's shelter situation and to other shelter situations, and (2) most of the concepts presented in the Guide were useful. However, the reviewers consistently classed the recommended data-gathering form as too burdensome and too idealistic. The findings in the study were reflected in a major revision of the Guide, now entitled, 'The Selection and Recruitment of Shelter Managers,' (Smith and Jeffreys, 1965) (AD-629 914). The scope of the guidance was reduced by separating the guidance for selection and recruitment from training and eliminating the discussion of the supporting research methodology. The Guide provides more detailed recommendations in a simple, 'how-to' format. Specific procedures, rather than general principles, are given for both selection and recruitment, providing comprehensive guidance applicable to the entire range of shelter situations.

AD-629 926 Fld. 5/1, 13/13
CFSTI Prices: HC $2.00 MF $0.50
AMERICAN INSTITUTES FOR RESEARCH PITTSBURGH PA INST FOR PERFORMANCE TECHNOLOGY
INTEGRATED GUIDANCE FOR SHELTER MANAGEMENT. PLANNING A GROUP SHELTER.
Technical rept.,
by Robert W. Smith, and Mary Ann Lasky. Jun 65, 31p. Rept. no. AIR-D93C-6/65-TR (1),
Contract OCD-PS-64-57,
Unclassified report

Descriptors: (*Fallout shelters, Management engineering), (*Management engineering, Fallout shelters), (*Management planning, Fallout shelters), Civil defense systems, Decision making, Instruction manuals, Training

The field-verification and revision of guidance materials for individual shelter planning was the purpose of the report. The existing planning guidance was modified to reflect changes in technology and the shelter planning philosophy, and a Sample Basic Shelter Plan was developed for inclusion in the guide. The sample consisted of sixteen communities selected to review and apply the guidance. Four plans were written during the application of the guidance. Three of these plans adhered closely to the AIR guidance materials and the fourth plan dealt primarily with shelter procedures. The critical comments made by the reviewers indicated that there were no technical inaccuracies and that the technical background information in the guide overlapped with that provided in shelter management training. The findings in this study were reflected in a revision of the guide. The guide has greater emphasis on shelter management, a section dealing with planning for shelter security, and more information on closing the shelter. Minor revisions were made to reflect changes in technology and changes in the Federal program. (Author)

AD-629 927 Fld. 5/1, 13/13
CFSTI Prices: HC $1.00 MF $0.50
AMERICAN INSTITUTES FOR RESEARCH PITTSBURGH PA INST FOR PERFORMANCE TECHNOLOGY
INTEGRATED GUIDANCE FOR SHELTER MANAGEMENT. PLANNING A GROUP SHELTER.
Summary of technical rept.,

by Robert W. Smith, and Mary Ann Lasky. Jun 65, 6p. Rept. no. AIR-D93C-6/65-TR (II), Contract OCD-PS-64-57,

Unclassified report

Descriptors: (*Fallout shelters, Management engineering), (*Management engineering, Fallout shelters), (*Management planning, Fallout shelters), Civil defense systems, Instruction manuals, Effectiveness

During the course of a previous project for the Office of Civil Defense, the American Institutes for Research developed a guidance document for individual shelter planning entitled Planning Guides for Dual-Purpose Shelters (Smith and Lasky, 1963) (AD-412 342). The information provided in that document was validated through review by knowledgable civil defense authorities. The question remained, however, as to whether local civil defense personnel could successfully apply this guidance to the preparation of actual shelter plans. The purpose of this project was to conduct field verification of the planning guide and to revise the document as required. The findings in this study were reflected in a major revision of the guide, now entitled Planning a Group Shelter (Smith and Lasky, 1965) (AD-629 926). Chapter 1 of the guide was revised to clarify the nature of shelter planning. So that it would receive proper consideration by shelter planners, the second chapter of the guide was revised to emphasize planning for shelter management. A section dealing with planning for shelter security was added to the guide. The section on warning and shelter entry includes more information on closing the shelter. Minor revisions were made to reflect changes in technology and changes in the Federal program which occurred during the course of this study.

AD-629 935 Fld. 5/1, 13/13
CFSTI Prices: HC $2.00 MF $0.50
AMERICAN INSTITUTES FOR RESEARCH PITTSBURGH PA INST FOR PERFORMANCE TECHNOLOGY
INTEGRATED GUIDANCE FOR SHELTER MANAGEMENT. SHELTER MANAGER'S GUIDE.
Technical rept.,
by Ada S. Brandegee, and Emil Bend. Jun 65, 26p. Rept. no. AIR-D93B-6/65-TR (c-1), Contract OCD-PS-64-57, Proj. 1533A,

Unclassified report

Descriptors: (*Fallout shelters, Management engineering), (*Management engineering, Fallout shelters), Instruction manuals, Civil defense systems, Decision making, Documentation

The purpose of the project was to develop and evaluate in-shelter guidance materials which any fallout shelter manager, trained or untrained, could use as an operational management guide. An initial version of the 'Shelter Manager's Guide' was used by both trained managers and emergent leaders in 24- and 48-hour habitability studies conducted by the American Institutes for Research. After the 'Shelter Manager's Guide' was revised, it was evaluated in an experimental comparison with other types of guidance materials. The final product is arranged by priority of management decisions and actions within five shelter phases: Entry, Initial Organization and Operations, Routine, Temporary Emergence, and Contingencies (emergencies). It provides the management decision and actions necessary to organize and operate a fallout shelter, and supplies the information which the manager needs to support these decisions and actions. (Author)

AD-629 939 Fld. 5/1, 13/13
CFSTI Prices: HC $6.00 MF $1.50
AMERICAN INSTITUTES FOR RESEARCH PITTSBURGH PA INST FOR PERFORMANCE TECHNOLOGY
INTEGRATED GUIDANCE FOR SHELTER MANAGEMENT. VOLUME I. INTRODUCTION TO SHELTER MANAGEMENT.
by Emil Bend, and Robert A. Collins. Jun 65, 300p. Rept. no. AIR-D93B-6/65-RP (b), Contract OCD-PS-64-57, Proj. 1533A,

Unclassified report

Descriptors: (*Fallout shelters, Management engineering), (*Management engineering, Fallout shelters), Management planning, Safety, Food, Public health, Social psychology, Radiobiology, Training, Civil defense systems, Communication systems

The volume is designed as a training text. It provides an overview of the scope and nature of the shelter manager's duties and responsibilities. The text emphasizes general management principles and considerations, rather than specific operational procedures.

AD-629 940 Fld. 5/1, 13/13
CFSTI Prices: HC $5.00 MF $1.00
AMERICAN INSTITUTES FOR RESEARCH PITTSBURGH PA INST FOR PERFORMANCE TECHNOLOGY
INTEGRATED GUIDANCE FOR SHELTER MANAGEMENT. VOLUME II. PLANNING A GROUP SHELTER.
A planning guide,
by Robert W. Smith, and Mary Ann Lasky. Jun 65, 167p. Rept. no. AIR-D93C 6/65-RP, Contract OCD-PS-64-57,

Unclassified report

See also AD-629 939.

Descriptors: (*Fallout shelters, Management engineering), (*Management engineering, Fallout shelters), (*Management planning, Fallout shelters), Radiation monitors, Civil defense systems, Maintenance, Air conditioning equipment, Safety, Food, Lighting equipment, Communication systems, Sanitary engineering

The volume deals with the peacetime responsibilities of the shelter manager which focus upon the achievement and maintenance of a state of operational readiness of a shelter facility. The planning guide discusses the principal factors that must be considered in planning and developing a group shelter. It also identifies methods for meeting the requirements associated with these factors, and presents specific information that would permit the shelter manager to select methods appropriate to his needs. (Author)

AD-629 941 Fld. 5/1, 13/13
CFSTI Prices: HC $6.00 MF $1.25
AMERICAN INSTITUTES FOR RESEARCH PITTSBURGH PA INST FOR PERFORMANCE TECHNOLOGY
INTEGRATED GUIDANCE FOR SHELTER MANAGEMENT. VOLUME III. SHELTER MANAGER'S GUIDE.
Guidance for in-shelter use,
by Ada S. Brandegee, and Emil Bend. Jun 65, 213p. Rept. no. AIR-D93B-6/65-RP (c), Contract OCD-PS-64-57, Proj. 1533A,

Unclassified report

See also AD-629 940.

Descriptors: (*Fallout shelters, Management engineering), (*Management engineering, Fallout shelters), Instruction manuals, Decision making, Civil defense systems, Disasters, Nuclear warfare, Survival, Maintenance

The volume was developed for use during the period of shelter occupancy. This means that the content, as well as its organization and presentation, was designed for optimum usefulness under emergency conditions. The Guide lists priority-ordered management actions and decisions, arranged according to the phases of a shelter stay. (Author)

AD-629 945 Fld. 5/1
QUEEN'S UNIV KINGSTON (ONTARIO)
THE CASE FOR AN INSTITUTE OF NATIONAL STUDIES,
by William Petrie, and Donald A. Grant. 1962, 10p.

Unclassified report

Availability: Published in Queen's Quarterly v68 n4 p567-73 Winter 1962. Copies to DDC users only.

Descriptors: (*Scientific organizations, Canada), Scientific research, Analysis

Two Canadian scientists point out that this country has 'no adequate means of assessing the impact of rapid technological, social, economic and political changes on the national and international scene' and propose the setting up of 'a properly constituted group with a mandate to undertake analytical studies of important problems.' (Author)

AD-629 979 Fld. 5/1, 5/9
DEFENCE RESEARCH TELECOMMUNICATIONS ESTABLISHMENT OTTAWA (ONTARIO)
RESEARCH INSTITUTIONS IN SCIENCE AND ENGINEERING,
by J. H. Chapman. 1965, 5p.

Unclassified report

Availability: Published in Engineering Journal, Journal of the Engineering Inst. of Canada, p3-6 Jul 1965. Copies to DDC users only.

Descriptors: (*Scientific research, Canada), (*Engineering, Canada), Scientific personnel, Engineering personnel, United States, Great Britain

The Engineering Institute of Canada is envisioned as the professional society having the paramount responsibility for providing the leadership, for taking the initiative for national action, in providing a national science policy that will capture new technology for Canada. Academic centers should be supplied with research facilities and staffed by outstanding men. Industry and government laboratories are implicated as well.

AD-630 015 Fld. 5/1, 13/13, 5/9
CFSTI Prices: HC $1.00 MF $0.50
AMERICAN INSTITUTES FOR RESEARCH PITTSBURGH PA INST FOR PERFORMANCE TECHNOLOGY
INTEGRATED GUIDANCE FOR SHELTER MANAGEMENT. INTRODUCTION TO SHELTER MANAGEMENT.
Technical rept.,
by Emil Bend, and Robert A. Collins. Jun 65, 17p. Rept. no. air-D93B-6/65-TR (b-1), Contract OCD-PS-64-57, Proj. 1533A

Unclassified report

Descriptors: (*Fallout shelters, Management engineering), (*Management engineering, Fallout shelters), Civil defense systems, Training, Textbooks

The product of the research described in this technical report was a training text entitled 'Introduction to Shelter Management.' The text was designed for use in end-product shelter management training. The technical report also briefly describes several different approaches to shelter management training into which the training text can be fit. The recommended approach was to use the text as background reading, and to use class meetings for discussions of specific problems and guidance pertinent to the particular group of shelter manager trainees attending the course. The content and organization of the textbook are briefly described in the report, and suggestions are offered for further research in the field of shelter management training. (Author)

AD-630 016 Fld. 5/1, 13/13, 5/9
CFSTI Prices: HC $1.00 MF $0.50
AMERICAN INSTITUTES FOR RESEARCH PITTSBURGH PA INST FOR PERFORMANCE TECHNOLOGY
INTEGRATED GUIDANCE FOR SHELTER MANAGEMENT. INTRODUCTION TO SHELTER MANAGEMENT.
Summary of technical rept.,
by Emil Bend, and Robert A. Collins. Jun 65, 6p.
Rept. no. air-D93B-6/65-TR (b-11),
Contract OCD-PS-64-57,

Unclassified report

Descriptors: (*Fallout shelters, Management engineering), (*Management engineering, Fallout shelters), Civil defense systems, Training, Standardization, Textbooks

The two-fold goal of the project was to prepare a standardized shelter management textbook and to develop an approach to shelter management training that would permit the text to serve the widest possible range of training situations. A number of individuals associated with the training of shelter managers have attested to the need of a standardized introduction to shelter management. It was felt that the development of a text would be a step towards the goal of standardized shelter management training. There were a number of problems inherent in the development of such a standardized approach. Among these problems were: (1) the great diversity in shelter management students, in terms of educational background and occupation; (2) the wide variation in curriculum of current shelter management training; and (3) the variety of conditions in local communities, including shelter configurations, environmental, political, and social differences. (Author)

AD-630 052 Fld. 5/1, 13/13, 5/9
CFSTI Prices: HC $1.00 MF $0.50
AMERICAN INSTITUTES FOR RESEARCH PITTSBURGH PA INST FOR PERFORMANCE TECHNOLOGY
INTEGRATED GUIDANCE FOR SHELTER MANAGEMENT. SHELTER MANAGER'S GUIDE.
Summary of technical rept.,
by Ada S. Brandegee, and Emil Bend. Jun 65,
8p. Rept. no. AIR-D93B-6/65-TR (c-11),
Contract OCD-PS-64-57,

Unclassified report

Descriptors: (*Fallout shelters, Management engineering), (*Management engineering, Fallout shelters), Civil defense systems, Decision making, Civil defense personnel, Training, Instruction manuals, Survival

The goal of the project was to prepare and test a 'Shelter Manager's Guide' which could be used in-shelter by either trained or untrained shelter managers to organize and run the shelter. The Guide must supply three kinds of ready information: (1) the step-by-step decisions and actions which a manager must make to organize and operate a fallout shelter; (2) immediate answers to critical shelter problems or contingencies which may suddenly arise; and (3) the supporting details, including: actual procedures, personnel and equipment requirements; and background information needed to implement the decisions and actions. (Author)

AD-630 097 Fld. 5/1, 12/2
NORTHWESTERN UNIV EVANSTON ILL TECHNOLOGICAL INST
SEARCH-THEORETIC MODELS OF ORGANIZATION CONTROL BY BUDGETED MULTIPLE GOALS.
Revised ed.,
by A. Charnes, and A. C. Stedry. Apr 65, 27p.
Contract Nonr-1228 (10), Proj. NR-047-021,

Unclassified report

Prepared in cooperation with Carnegie Inst. of Tech., Pittsburgh, Pa. under Contract Nonr-760 (24), Proj. NR-047-048. See also AD-615 086.

Availability: Published in Management Science v12 n5 p457-82 Jan 1966. Copies to DDC users only.

Descriptors: (*Management control systems, Mathematical models), (*Search theory, Mathematical models), (*Budgets, Control), Optimization, Decision theory, Operations research, Probability, Management engineering, Mathematical programming, Decision theory, Theory

Models of situations in which individuals are faced with multiple activities among which they must allocate their effort are postulated. Optimal allocations are found for four assumed motivational structures--profit maximization and three involving performance goals in each of the activities. Heuristic approximations to the optimal allocations are developed. Also, the relationships between the various motivation structures are explored. (Author)

AD-630 191 Fld. 5/1, 12/1, 20/5, 21/9,+
CFSTI Prices: HC $3.00 MF $0.75
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
FOREIGN SCIENCE BULLETIN, VOLUME 2, NO. 3.
Mar 66, 72p.
TT 66-60792

Unclassified report

A Monthly Review of Selected Foreign Scientific and Technical Literature Sponsored by the Department of Defense.

Descriptors: (*Scientific research, Reviews), (*Special functions, Reviews), (*Lasers, Reviews), (*Composite propellants, Reviews), (*Polyester plastics, Reviews), Pattern recognition, Semiconductors, Combustion, Heat-resistant plastics, Ionospheric propagation, Microwave equipment, Solid jet engine fuels, Liquid metals, Plastics, Atmosphere

Contents: The method of potential functions; Two -photon optically pumped semiconductor lasers; The controlling zone in the combustion of composite propellants; New trends in the development of aromatic polyesters-polyarylates-in the USSR; Loss in antenna gain in long-haul UHF tropospheric propagation; Microwave techniques for lasers; Solid fuels for ramjet engines; High-temperature properties of liquid alkali metals; Effect of fillers on the morphological forms and mechanical properties of crystalline polymers; Conference on the spectral transparency of the atmosphere in the visible and infrared regions of the spectrum; Some problems in material science; L. D. Landau; Molecular scattering of light (book review); Methods of studying the most recent and contemporary tectonics of the shelf zones of seas and oceans (book review).

AD-630 325 Fld. 5/1, 13/2, 13/4, 13/6,+
CFSTI Prices: HC $2.00 MF $0.50
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
PROTECTIVE STRUCTURES AND COMPONENTS: COMPILATION OF ABSTRACTS.
Rept. no. 17 on ATD work assignment no. 13,
by Victor Klein. 7 Jan 66, 29p. Rept. no. ATD-66-3,
TT 66-60822

Unclassified report

Soviet-bloc literature on protective structures and components, 1 Apr-30 Sep 65. Rept. on Surveys of Communist World Scientific and Technical Literature.

Descriptors: (*Engineering, USSR), (*Scientific research, USSR), (*Abstracts, Scientific research), Reviews, Pipes, Airships, Vehicles, Construction, Roads, Ships, Inland waterways, Hoists, Containers, Transportation, Ground support equipment

This compilation of abstracts is based on Soviet-Satellite open sources published 1963-1965. It is the 17th report on protective structures and components and was prepared in response to the following areas of interest: 1. Operational employment and philosophy; 2. Missile or space vehicle; 3. Facilities; 4. Transportation; 5. Launch site; 6. Ground support equipment; 7. Natural environment conditions (site and facilites); 8. Personnel; 9. Packaging, preservation, and storage. This report contains information relevant to topics 3, 4, 5, and 9. Of 20 entries 1 is found in topic 3, 15 in topic 4, 2 in topic 5, and 2 in topic 9. Other information included: dirigible, semitrailer, heavy duty and special type tractors, special vehicles, highway tunnel, highway bridge, railway bridge, bridge construction under Arctic and permafrost conditions, snow compacting machine, minerals and railroad lines in Arctic and permafrost areas, ships and barges, waterways, gantries or structures. The bibliography contains 20 entries. (Author)

AD-629 769 See Fld. 1/2

AD-630 118 See Fld. 15/5

AD-630 132 See Fld. 15/5

AD-630 197 See Fld. 13/8

5/2. DOCUMENTATION AND INFORMATION TECHNOLOGY

AD-629 801 Fld. 5/2, 12/1
WESTERN RESERVE UNIV CLEVELAND OHIO CENTER FOR DOCUMENTATION AND COMMUNICATION RESEARCH
ON THE LOGIC OF INFORMATION RETRIEVAL,
by William Goffman. 1964, 6p. Contract AF-AFOSR-403-64, Proj. AF-9769, Task 976901, AFOSR 65-2690

Unclassified report

Availability: Published in Information Storage and Retrieval v2 p217-20 1965. Copies to DDC users only.

Descriptors: (*Information retrieval, Mathematical logic), (*Mathematical logic, Information retrieval), Theorems

An information retrieval process may in general be characterized in terms of two sets Q and S with a relation R. Q represents queries, S a file of documents, and the relation R, called relevance, is a property which assigns to any q in Q a certain subset A of S called the answer to q. The classical two-valued propositional calculus has generally been accepted as the underlying logic of an information retrieval process. However, the Boolean model has been shown inadequate for describing an informaton retrieval process, and it follows that the two-valued propositional logic is also inadequate. The logical system which seems most appropriate is the probability logic suggested by Reichenbach. A theorem is proved that a system cannot be represented by a finite valued system having single valued truth tables. In an infinitely valued logic terms of information retrieval, this theorem implies that no finite valued logic is adequate for representing an information retrieval process. (Author)

AD-629 910 Fld. 5/2
CFSTI Prices: HC $1.00 MF $0.50
RAND CORP SANTA MONICA CALIF
PROBLEMS OF ALGORITHMIC COMPOSITION OF SUBJECT INDEXES (BRIEF SURVEY OF FOREIGN LITERATURE),
by B. V. Iakushin. 15 Mar 66, 18p. Rept. no. LT-65-102,
TT 66-60760

Unclassified report

Trans. of Nauchno-Tekhnicheskaya Informatsiya (USSR) n5 p22-5 1965.

Descriptors: (*Subject indexing, Automatic), State-of-the-art reviews, Classification, Algorithms, Computational linguistics, Statistical analysis

Major trends in developing methods of machine assignment of subject indexes are examined. Two approaches are discernible: (a) the use of subject descriptors based on key words extracted from the document (usually from the title); (b) the use of predetermined subject categories under which documents are indexed. It is noted that the systems that rely on statistical characteristics of the appearance of key words in the documents are the more promising. (Author)

AD-630 089 Fld. 5/2, 9/2
CFSTI Prices: HC $6.00 MF $1.50
AUERBACH CORP PHILADELPHIA PA
INFORMATION STORAGE AND RETRIEVAL, A STATE-OF-THE-ART REPORT,
by Lawrence Berul. 14 Sep 64, 249p. Rept. no. PR-7500-145,
Unclassified report

Descriptors: (*Information retrieval, State-of-the-art reviews), Feedback, Reports, Data, Classification, Subject indexing, Libraries, Abstracts, Processing, Periodicals, Indexes, Costs, Technical information centers, Microfilm, Magnetic tape, Computers, Programming (Computers), Programming languages, Dictionaries

The objective of the study was to compile relevant background and interpretive material and prepare a state-of-the-art report which would put the developments in the IS and R field into perspective and serve to orient a newcomer into this field. Section II describes IS and R as a problem in person-to-person communications. Section III presents basic IS and R concepts and techniques. It traces the history of traditional librarianship through early IS and R systems and up to the present state-of-the-art. Section IV describes the information products and services which are being employed to aid the process of communication between the originators and users of information. Section V categorizes the information system operations required to produce the products and services, into eight basic system functions from which all IS and R systems can be assembled. These basic functions are: origination, acquisition, surrogation, announcement, index operation, document management, correlation, and end-use. Section VI describes five examples of IS and R applications or systems.

AD-630 127 Fld. 5/2, 9/2
CFSTI Prices: HC $6.00 MF $1.00
IBM FEDERAL SYSTEMS DIV BETHESDA MD
DISCRIMINANT ANALYSIS FOR CONTENT CLASSIFICATION.
Final rept., 23 Nov 64-22 Nov 65,
by John H. Williams,Jr.. Feb 66, 283p. Contract AF 30 (602)-3563, Proj. AF-4594, RADC TR-66-6
Unclassified report

See also AD-612 272.

Descriptors: (*Subject indexing, Automatic), (*Functional analysis, Subject indexing), (*Reports, Classification), (*Classification, Reports), Statistical analysis, Effectiveness, Solid state physics, Programming (Computers), Frequency

A series of experiments was performed to investigate the effectiveness and utility of automatically classifying documents through the use of multiple discriminant functions. Classification is accomplished by computing the distance from the mean vector of each category to the vector of observed frequencies of a document and assigning the document to the category having the highest probability. Data concerning the effect of the principal classification parameters on classification performance is reported, based on a data base of approximately 2700 abstracts from the solid state physics field. The parameters studied were the number of sample documents required to define a category, the length of documents, the interrelationship of the number of sample documents and their lengths, the relation of the number of word types in a document to the number of categories assigned to it, levels in a structure, homogeneity of categories, and performance measures. A higher performance level was obtained when samples of 140 documents were used to define each category than with samples of 35 and 70 documents. Classification results obtained on independent test sets of documents ranged from 73 to 92 percent. The test sets contained 419 and 1333 documents. Results are also reported in terms of Swets' effectiveness measure and Cleverdon's ratios of relevance, recall and precision. (Author)

AD-630 150 Fld. 5/2, 9/2
CFSTI Prices: HC $1.00 MF $0.50
SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
SATIRE: A USER'S SYSTEM OF INFORMATION RETRIEVAL,
by M. J. Healy. 1 Apr 64, 24p. Rept. no. SP-1432,
Unclassified report

Descriptors: (*Information retrieval, Indexes), Electronic accounting machines, Computers, Documentation, Subject indexing, Punched cards

Satire (Semiautomatic Technical Information Retrieval) combines the procedures of library science with the techniques of machine processing to replace manual methods of retrieving information from a constantly growing document file. The system produces subject, numeric, alphabetic, source, and source code indexes. It can operate with electronic accounting machines or with an electronic computer which allows on-line interrogation and display.

AD-630 151 Fld. 5/2, 9/2
CFSTI Prices: HC $2.60 MF $0.50
SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
INFORMATION MANAGEMENT-A STATE-OF-THE -ART STUDY. PART I - SYNOPSIS OF ORGANIZATIONS AND RESEARCH ACTIVITIES.
Technical memo.,
by Carole E. Bare. 8 Oct 62, 30p. Rept. no. TM-(L)-763/000/01,
Unclassified report

Descriptors: (*Documentation, State-of-the-art reviews), Information retrieval, Reports, Scientific organizations, Abstracts, Processing, Subject indexing, Search theory, Scientific research, Input -output devices, Special purpose computers

Information retrieval, which has traditionally included indexing and abstracting activities, is seen as only one of the major functions in an information system. A more broadly conceptualized information system should provide control over more varied and complex functions, such as those involved in problem-solving. Therefore, research activities in this area, which have up to now been labelled as information retrieval studies, will be discussed in this report from the more comprehensive viewpoint of an 'information management' system. A state-of-the-art study in the information management area was undertaken since participation in this rapidly growing field should be based on sound decisions regarding the content areas as well as the methods and techniques which are to be applied. In this first report, a synopsis of research organizations and their sponsors is presented. In addition, several classification systems of the various functions of an information management system are described and evaluated. Trends which indicate the direction in which the field is moving are outlined. (Author)

AD-630 152 Fld. 5/2, 9/2
CFSTI Prices: HC $2.60 MF $0.50
SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
INFORMATION RETRIEVAL.
Technology series.
1966, 23p.
Unclassified report

Descriptors: (*Information retrieval, History), Data processing systems, Data storage systems, Computers, Special purpose computers

'Information management' is a term that is preferred to 'information retrieval' by System Development Corporation. Information management is defined as the establishment and utilization of effective procedures for controlling the generation, processing, flow, and use of information. This treatise on information retrieval is divided into 6 parts (1) The information problem. (2) Historical development: documentation, business systems, military sytems. (3) Military applications: SAC Control System, intelligence systems, data base management. (4) Nonmilitary applications: medicine, education, metropolitan government, law enforcement, law, scientific and technical information, in-house development and use. (5) Research: classification and indexing procedures, linguistics and communication analysis, 'fact retrieval', natural language processing. (6) Future of information management.

AD-629 789 **See Fld. 5/7**

5/3. ECONOMICS

AD-630 298 Fld. 5/3
CFSTI Prices: HC $1.10 MF $0.50
RAND CORP SANTA MONICA CALIF
BOOK REVIEW: THE STRUCTURE AND PERFORMANCE OF THE AEROSPACE INDUSTRY,
by Arnold Kramish. Mar 66, 3p. Rept. no. P-3330,
Unclassified report

Descriptors: (*Aircraft industry, Economics), Aerospace craft, Aerospace planes, History, Government procurement

Review of book by Herman O. Stekler: The book should find its major readership among those sectors of aerospace management concerned primarily with contract policy, and it should be of interest to other sectors of management desiring general orientation on contract problems and on how they have affected the structure of the aerospace industry. The historical development, mainly in economic terms, of the industry is traced from the World War I period into the early 1960 period with emphasis detailing the competitive practices and some of the problems of conversion into and out of industry. The book lacks analyses of the effectiveness of government procurement policies and the void in relating the growth and difficulties of the industry to changes in strategic outlook.

AD-630 487 Fld. 5/3
CFSTI Prices: HC $2.00 MF $0.50
STANFORD UNIV CALIF INST FOR MATHEMATICAL STUDIES IN THE SOCIAL SCIENCES
COMMENTS ON TECHNICAL PROGRESS.
Technical rept.,
by Ronald W. Jones. 31 Jan 66, 31p. Rept. no. TR-140,
Contract Nonr-225 (50), Proj. NR-047-004,
Unclassified report

Descriptors: (*Economics, Mathematical models), (*Economic conditions, Mathematical models), Mathematical prediction, Labor, Costs, Industrial production, Money

The article consists of various comments on the classification of disembodied, exogenously given

technical progress. The connections among three alternative sets of parametric relationships of technical change are discussed. (Changes in marginal products, changes in input-output coefficients, augmenting coefficients applied to the inputs in a production function). A general concept of 'neutrality' is introduced to point out the symmetry as between the Hicks and Harrod classifications. (J.R. Hicks, 'The Theory of wages. Macmillan and Co., 1932. R. F. Harrod, 'Towards a dynamic economics.' London, 1948). Conditions for preserving 'neutrality' under aggregation are derived. (Author)

AD-629 880 **See Fld. 15/7**

AD-629 909 **See Fld. 13/10**

5/4. HISTORY, LAW AND POLITICAL SCIENCE

AD-630 299 Fld. 5/4
CFSTI Prices: HC $1.10 MF $0.50
RAND CORP SANTA MONICA CALIF
BOOK REVIEW: SECRECY AND THE ARMS RACE: A THEORY OF THE ACCUMULATION OF STRATEGIC WEAPONS AND HOW SECRECY ACCUMULATION OF STRATEGIC WEAPONS AND HOW SECRECY AFFECTS IT,
by Arnold Kramish. Mar 66, 3p. Rept. no. p-3331,
Unclassified report

Descriptors: (*Arms control, Theory), Strategic weapons, Foreign policy

Review of the book by Martin C. McGuire. The qualitative limits of the book are demonstrated rigorously through the analytical techniques which have become common under the guise of 'conflict and resolution'. The study is primarily directed at the manner in which weapons development and buildup precede conflict. There is some attention given to the relationship of the factors which initiate hostilities and the process of weapons buildup. This is essentially economic theory, and it is doubtful that the classicists among political scientists will wish to wend their torturous way through the equations and graphs; although, if such an individual has in mind developing his understanding of the application of systems analysis to political problems, this book in its fairly narrow context is a worthy introduction to its disciplinary domain. The last two chapters, 'Secrecy and Interaction in the Arms Race' and 'Information Exchange and Arms Control', illustrate effectively the necessity for flexibility in secrecy and information processes.

5/6. HUMANITIES

AD-630 405 **See Fld. 8/2**

5/7. LINGUISTICS

AD-629 789 Fld. 5/7, 9/2, 6/4, 5/2
CFSTI Prices: HC $13.60 MF $1.00
SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
STYLISTIC ANALYSIS: REPORT ON THE SECOND YEAR OF RESEARCH.
Technical memo.,
by Sally Yeates Sedelow. 1 Mar 66, 138p. Rept. no. TM-1908/200/00,
Contract Nonr-4427 (00) Proj. NR-348-005,
Unclassified report

See also AD-613 291, AD-629 368.

Descriptors: (*Language, Analysis), (*Programming (Computers), Language), Computational linguistics, Pattern recognition, Syntax, Information retrieval

The document describes the current capabilities of the computer-based programs being developed for the analysis of style. The power of the programs for content analysis, semantic analysis and stylistic discrimination is evaluated on the basis of their analytical runs on natural language text. The value of such output for political and diplomatic negotitations, as well as for more longrange projects involving information retrieval and automatic language production, etc., is illustrated. (Author)

AD-630 176 Fld. 5/7, 5/10
DARTMOUTH COLL HANOVER N H
INVARIANCE OF PERSONAL CHARACTERISTICS OF VOICE OVER TWO VOWEL SOUNDS,
by Victor E. McGee. 9 Aug 65, 11p. Contract Nonr-3897 (05)
Unclassified report

Availability: Published in Perceptual and Motor Skills v21 p519-29 1965. Copies to DDC users only.

Descriptors: (*Phonetics, Invariance), Verbal behavior, Acoustics, Correlation techniques

19 adult male voices were analyzed acoustically over two vowel sounds--/ee/ as in 'heed' and /aw/ as in 'hawed'. It was found that the individual differences observed on the utterances of /ee/ were preserved very closely (invariant) on the utterances of /aw/. Frequencies between 1000 cps and 2300 cps appeared not to play any part in producing this invariance. (Author)

AD-630 493 Fld. 5/7
MASSACHUSETTS INST OF TECH CAMBRIDGE
SOME CONTROVERSIAL QUESTIONS IN PHONOLOGICAL THEORY,
by Noam Chomsky, and Morris Halle. 5 Mar 65, 42p. Contract DA-36-039-AMC-03200 (E), NSF-GP-2495
Unclassified report

Availability: Published in Journal of Linguistics v1 n2 p97-214 Oct 1965. Copies to DDC users only.

Descriptors: (*Phonetics, Theory), Transformational grammars, Linguistics, Grammars, Syntax

Reply to article of F. W. Householder (Journal of Linguistics, 1:13-34- (1965)) concerning the phonological component of a generative grammar. The article of Householder refers to papers of Halle ('Phonology in generative grammar,' 'Word,' 18:54-72 (1962) and Fodor and Katz, 'The structure of language: readings in the philosophy of language,' Englewood Cliffs, N. J., Prentice -Hall, 1964, p.334-352) and of Chomsky ('The logical basis of linguistic theory' in 'Preprints, Ninth International Congress of Linguistics'. Cambridge, Mass., 1962, p. 509-574, and 'Current issues in linguistic theory' (Janua Linguarum, Series minor 38). The Hague, Mouton, 1964). The reply is in 7 parts: goals of linguistic theory, independence of phonology, status of phonemes versus features, adequacy of Jakobson's theory with respect to natural classes, validity of procedures of taxonomic linguistics, and phonetic basis of phonemic analysis.

AD-630 336 **See Fld. 9/4**

5/8. MAN-MACHINE RELATIONS

AD-630 149 **See Fld. 12/2**

5/9. PERSONNEL SELECTION, TRAINING AND EVALUATION

AD-629 992 Fld. 5/9
CFSTI Prices: HC $3.00 MF $0.50
APPLIED SCIENCE ASSOCIATES INC VALENCIA PA
EFFECT OF FORMAT AND DETAIL OF JOB PERFORMANCE AIDS IN PERFORMING SIMULATED TROUBLESHOOTING TASKS.
Final rept. Nov 63-Nov 64,
by Thomas K. Elliott. Nov 65, 52p. Contract AF 33 (615)-1137, Proj. AF-1710, Task 171004, AMRL TR-65-154
Unclassified report

Descriptors: (*Training devices, Effectiveness), (*Achievement tests, Training), Aptitude tests, Performance (Human), Job analysis, Data storage systems, Simulation, Maintenance

The effects of performance aid format, performance aid detail, and subject aptitude on the performance of paper and pencil data flow analysis tasks were measured. Sixteen subjects were used in a 2 x 2 x 2 design. Eight of these subjects scored between the 75th and 95th percentiles on the electronic aptitude index of the Airman Qualifying Exam, the other eight, between the 40th and 60th percentiles. Each subject received approximately 30 hours of training and practice, following which he was tested at one of the two levels of detail. Each subject was tested for 9 hours with aids in the block diagram format and for 9 hours with aids in the list structure format. Order of testing was counterbalanced across subjects. Criterion measures were: 1) number of problems attempted; 2) percentage of errorless localizations: 3) number of localization errors per problem; 4) number of localization errors of exclusion per problem, and; 5) percentage of errorless isolations. Subject aptitude was found to have the greatest effect on the accuracy with which subjects performed both localization and isolation tasks. Level of detail had the greatest effect on their speed (low level of detail subjects solved nearly twice as many problems as high level of detail subjects.) Performance was better with the diagrams than with the list structures. (Authur)

AD-630 170 Fld. 5/9, 5/10
APPLIED PSYCHOLOGICAL SERVICES WAYNE PA
COMPARISON OF CATEGORY AND MAGNITUDE SCALES OF TECHNICAL SKILLS,
by Mark G. Pfeiffer, and Arthur I. Siegel. 19 Nov 65, 16p. Contract Nonr-2279 (00)
Unclassified report

Availability: Published in Perceptual and Motor Skills, Monograph Supplement 3-V22 p235-48 1966. Copies to DDC users only.

Descriptors: (*Job analysis, Electronics), (*Psychometrics, Analysis of variance), Scale, Aviation personnel, Correlation techniques

Magnitude and category scaling methods were employed by journeymen electronics personnel to scale the apparent complexity of various aspects of their own job. The resultant data indicated that essentially equivalent scales were produced across the methods and that the continua of perceived complexity of 4 'activity' stimuli and of 16 'circuit' stimuli were metathetic. Since the distortions as the result of the introduction of different scaling methods were minimal, the present data suggested support for a single psychophysical law in the avionics job performance area. (Author)

AD-630 246 Fld. 5/9
CFSTI Prices: HC $8.60 MF $0.75
NAVAL TRAINING DEVICE CENTER PORT WASHINGTON N Y
A SURVEY OF EUROPEAN TRAINING DEVICES.
Final rept. (technical),
by Kenneth F. Thomson, and Charles F. Houff. May 65, 87p. Rept. no. NTDC-1H-17, Proj. 1902, Task 19022,
Unclassified report

Descriptors: (*Training devices, Military training), (*Army training, Site selection), Europe, Reviews, Terrain models, Feasibility

studies, Armed forces (Foreign), Warfare, Models (Simulations)

The United States Continental Army Command requirements dealing with the miniaturization of the battlefield (minimizing the amount of physical terrain required for Army training) have generated a number of research efforts. One of these efforts, covered by the report, was a survey of European training devices. The limited terrain available in Europe has imposed stringent real estate requirements for generations, and it was therefore thought fruitful to examine European solutions to problems of military training in constricted geographical areas. The report encompasses the results of a survey of extant European training devices along with descriptions and estimates of the utility of these devices in application to problems of training the United States Army. (Author)

AD-630 260 Fld. 5/9
CFSTI Prices: HC $3.00 MF $0.75
ABERDEEN UNIV (SCOTLAND)
THE USE OF CUING IN TRAINING TASKS: PHASE II.
Final technical rept. 30 Jun 64-1 Oct 65,
by JohnAnnett. Feb 66, 82p. Contract N62558-4119, Proj. 7570-3,
NAVTRADEVCEN 4119-1
Unclassified report

Descriptors: (*Training, Teaching methods), (*Teaching methods, Effectiveness), Auditory acuity, Detection, Psychometrics, Feedback, Great Britain

The report falls into three sections: a review of the literature on training for auditory tasks, an account of three experiments comparing cuing and knowledge of results as training techniques for a detection task, and the comparison of cuing and knowledge of results in an intensity discrimination task. (Author)

AD-630 275 Fld. 5/9, 5/10
CFSTI Prices: HC $3.00 MF $0.75
NAVAL TRAINING DEVICE CENTER PORT WASHINGTON N Y
AN ANALYSIS OF INDUCED MOTION.
Final technical rept.,
by Leonard Brosgole. Feb 66, 66p. Rept. no. NAVTRADEVCEN-IH-48,
Unclassified report

Descriptors: (*Motion, Perception (Psychology)), (*Training, Target discrimination), Targets, Detection, Analysis, Visual perception

Through an analysis of induced motion, the long standing concept of 'object-relative displacement' was rejected in favor of a new theory of motion perception which stresses egocentric location change. Several problems in movement perception (including simulated body movement) were evaluated in terms of this location change theory. (Author)

AD-630 312 Fld. 5/9, 15/7
CFSTI Prices: HC $10.60 MF $0.75
HUMAN SCIENCES RESEARCH INC MCLEAN VA
STUDY OF FUNCTIONAL REQUIREMENTS OF TRAINING EQUIPMENT FOR ARMY COMMAND TACTICAL DECISION MAKING.
Final technical rept., 15 Feb 63-30 Jul 65,
by Willard S. Vaughn,Jr., Richard D. Franklin, and Russell B. Johnson. Feb 66, 105p. Contract N61339-1341, Proj. 1902-3-Pt-2,
NAVTRADEVCEN 1341-1
Unclassified report

Descriptors: (*Training devices, Decision making), Tactical warfare, Army training, Military requirements

A study was make to identify functional requirements of future devices for training in command tactical decision making. Performance requirements of the development and adjustment of a scheme of maneuver or tactical plan are defined in terms of eleven task components of the decision-making process and in terms of the characteristics of the tactical information environment in which these decision tasks are performed. Present Army training techniques are critically reviewed in terms of the extent to which they provide training in the eleven component decision tasks under realistic information states. Four sets of experiments are described which obtained behavioral data on the effects of both variations in problem presentation characteristics and variation in group vs. individual problem solving on decision task performance. Results of these experiments provide a base for recommendations for device characteristics which satisfy functional, learning efficiency and utilization efficiency requirements. (Author)

AD-630 477 Fld. 5/9, 6/14
SCHOOL OF AEROSPACE MEDICINE BROOKS AFB TEX
PSYCHIATRIC SELECTION OF CANDIDATES FOR SPACE MISSIONS,
by Carlos J. G. Perry. 1965, 8p. Rept. no. sam-TR-65-241,
Proj. AF-7755,
Unclassified report

Availability: Published in Journal of the American Medical Society v194 n8 p841-4 Nov 22 1965. Copies to DDC users only.

Descriptors: (*Space crews, Selection), (*Psychiatry, Space crews), Applied psychology, Personality, Motivation, Stress (Physiology), Stress (Psychology)

Fifteen candidates for a space mission were evaluated by a team of two psychiatrists and a clinical psychologist. All of the candidates were found to be qualified as being free from psychopathology. Beyond this, a rank order of the candidates was developed, based on positive factors of suitability for the assignment. There are no ready-made guidelines, specific stress situations, or personality type qualifications on which to readily determine such a selection. The psychiatrist must approach such a task in a globally oriented manner, making the most of his talent for empathic understanding of the individual candidate's personality and motivations. (Author)

AD-630 484 Fld. 5/9
CFSTI Prices: HC $1.00 MF $0.50
HUMAN RESOURCES RESEARCH OFFICE GEORGE WASHINGTON UNIV ALEXANDRIA VA
CHANGES IN FLIGHT TRAINEE PERFORMANCE FOLLOWING SYNTHETIC HELICOPTER FLIGHT TRAINING,
by Paul W. Caro,Jr., and Robert N. Isley. Apr 66, 14p. Rept. no. 1-66,
Contract DA-44-188-ARO-2,
Unclassified report

Prepared for presentation at Annual Southeastern Psychological Association Meeting (12th), New Orleans, La., 2 April 1966.

Descriptors: (*Pilots, Military training), (*Training devices, Effectiveness), (*Flight simulators, Helicopters), Performance (Human), Teaching methods, Students, Analysis of variance

The paper deals with a determination of the training value of certain training device concepts and techniques in Army helicopter contact flight training.

AD-630 518 Fld. 5/9
CFSTI Prices: HC $3.00 MF $0.50
DUNLAP AND ASSOCIATES INC DARIEN CONN
STUDIES OF DIVERS' PERFORMANCE DURING THE SEALAB II PROJECT.
Final rept. Mar 66,
by Hugh M. Bowen, Birger Andersen, and David Promisel. Mar 66, 52p. Rept. no. ssd-66-296 (571),
Contract Nonr-4930 (00)
Unclassified report

Descriptors: (*Diving, Performance tests), Underwater, Personnel, Performance (Human), Psychomotor tests, Psychometrics, Underwater equipment

Field studies of the three 10 men teams of divers participating in the SEALAB II project were undertaken. During each team's 15 day submergence at 205 feet, psychomotor tests and a vision test were conducted in the water, and a mental arithmetic test in the habitat. Compared to base line performance (dry-land and shallow water conditions), performance on the mental arithmetic test showed no deterioration while performance on the psychomotor tests showed considerable deterioration. Many divers found that their in-water activities proceeded slowly; among other causes of a more physical nature, concern for one's safety may detract from the amount of attention one gives to the task at hand. The most active divers in the SEALAB group were those who indicated that they were least fearful and least aroused by the conditions and who were helpful, gregarious, and made least telephone contact with the outside world. (Author)

AD-629 874 **See Fld. 1/3**

AD-629 914 **See Fld. 5/1**

AD-629 915 **See Fld. 5/1**

AD-629 979 **See Fld. 5/1**

AD-630 015 **See Fld. 5/1**

AD-630 016 **See Fld. 5/1**

AD-630 052 **See Fld. 5/1**

AD-630 278 **See Fld. 21/4**

AD-630 453 **See Fld. 5/10**

AD-630 475 **See Fld. 5/10**

5/10. PSYCHOLOGY (INDIVIDUAL AND GROUP BEHAVIOR)

AD-629 759 Fld. 5/10
TUFTS UNIV MEDFORD MASS INST FOR PSYCHOLOGICAL RESEARCH
PREDICTION OF SPEED OF PERFORMANCE BY MUSCLE ACTION POTENTIALS,
by John L. Kennedy, and Roland C. Travis. 1947, 2p. Contract N5ori-58,
NTDC 58-2-4
Unclassified report

Availability: Published in Science v105 n2729 p410-1 18 Apr 1947. Copies to DDC users only.

Descriptors: (*Neuromuscular transmission, Time), (*Muscles, Motor reactions), (*Conditioned reflex, Performance tests), Reflexes, Psychometrics, Phsychophysiology, Counting methods

By the use of an electronic counting technique a relationship was found between reaction time to aperiodic stimuli in a monotonous situation and frequency of muscle action potentials (recorded from bipolar electrodes placed above the eyes) during a 6-second interval before the onset of the stimuli.

AD-629 829 Fld. 5/10
PRINCETON UNIV N J
COMPLEX DISCRIMINATION WITH TWO STAGES OF SOLUTION,

by Mymon Goldstein, and William B. Turpin. 11 Aug 65, 7p. Contract AF-AFOSR-965-65 ,AF-AFOSR-62-197
AFOSR 65-2663

Unclassified report

Availability: Published in Perceptual and Motor Skills v21 p491-6 1965. Copies to DDC users only.

Descriptors: (*Problem solving, Display systems), Performance tests, Perception (Psychology)

A 4-display contingent identity discrimination design was combined with a 4-display contingent position discrimination design to produce a merged task whose 8 displays appeared repeatedly over a sequence of trials. Human Ss solved the contingent identity portion of the task first in nearly all cases and maintained a high level of accuracy on the solved portion while coping with the remainder. Experimental variations related to the visual distinctiveness of the two portions proved unimportant. (Author)

AD-629 856 Fld. 5/10
KANSAS STATE UNIV MANHATTAN
NUMBER OF ALTERNATIVES AND SEQUENCE LENGTH IN ACQUISITION OF A STEP-FUNCTION TRACKING TASK,
by Don Trumbo, Merrill Noble, and Lynn Ulrich. 14 Aug 65, 9p. Contract AF-AFOSR-526-64, AFOSR 65-2668

Unclassified report

Availability: Published in Perceptual and Motor Skills v21 p563-9 1965. Copies to DDC users only.

Descriptors: (*Target acquisition, Tracking), (*Tracking, Psychomotor tests), Combinatorial analysis, Performance (Human), Learning

The roles of two task parameters, sequence length (N) and number of alternatives in the population from which the sequence was drawn (K), were examined in a tracking task. The tasks were irregular step-function inputs wherein N was defined as the number of targets (steps) in a repeating sequence and K was defined as the number of alternative target positions. N and K were varied independently in a 3 X 3 factorial design with 9 Ss per cell. The major findings were that tracking performance, as measured by integrated error scores, is affected by increases in N, but not proportionately, while neither K nor the N X K interaction was significant. Relations of the results to verbal learning data are discussed. (Author)

AD-629 859 Fld. 5/10
CFSTI Prices: HC $1.60 MF $0.50
DEPARTMENT OF THE NAVY WASHINGTON D C
THE MORALE FACTOR AND ITS ROLE IN A MODERN WAR,
by B. Belyi, and G. Fedorov. 1966, 13p. Rept. no. Translation-874,
TT 66-60751

Unclassified report

Moralnyi Faktor i ego Rolb Sovremennoi Voine, trans. of Kommunist Vooruzhennykh Sil (USSR) n9 p16-24 May 1961.

Descriptors: (*Attitudes, Military personnel), (*Warfare, Public opinion), (*Military psychology, Attitudes), Army personnel, USSR, Political science

AD-629 902 Fld. 5/10
ANTIOCH COLL YELLOW SPRINGS OHIO BEHAVIOR RESEARCH LAB
PRIMACY-RECENCY EFFECTS IN FREE RECALL,
by Barbara P. Thomson, and John F. Wing. Sep 65, 6p. Contract AF 33 (657)-7362, Proj. AF-7183, Task 718305.
AMRL TR-65-164

Unclassified report

Availability: Published in Proceedings of Annual Convention of American Psychological Association (73rd) p57-8 Sep 1965. Copies to DDC users only.

Descriptors: (*Recall, Psychometrics), Memory, Retention, Learning

In this study primacy and recency were found to change as a joint function of rate of presentation and ordinal position of a list within a series of lists. The first list of a series produced greater primacy than recency at a slow rate (5 seconds) but the opposite at a fast rate (2 seconds). This was true for 10, 15, and 20 item lists. For subsequent lists of a series the curves showed greater recency at both rates and for all list lengths. These findings establish that serial-position curves averaged over many lists are not the same as curves based on a single list. (Author)

AD-629 949 Fld. 5/10
WATERLOO UNIV (ONTARIO)
TIMING OF PUNISHMENT AND THE OBSERVATION OF CONSEQUENCES TO OTHERS AS DETERMINANTS OF RESPONSE INHIBITION,
by Richard H. Walters, Ross D. Parke, and Valerie A. Cane. 1965, 22p. Contract DRB-9401-24,

Unclassified report

Availability: Published in Journal of Experimental Child Psychology v2 n1 p10-30 Mar 1965. Copies to DDC users only.

Descriptors: (*Reaction (Psychology), Inhibition), Scheduling, Canada, Children

Eighty Grade 1 and kindergarten children were assigned to one of eight conditions in a 2 x 4 factorial design involving two conditions of timing of punishment and four film conditions. Half the children under each film condition received punishment as they initiated a deviant response sequence; the remaining Ss were punished only after completing the deviation. After punishment training, Ss were assigned to one of four film conditions: film model rewarded for deviation; film model punished for deviation; no consequence to the film model; no film. Ss who received early punishment subsequently showed more resistance to deviation than Ss for whom punishment was delayed. There were significant differences among Ss under the four film conditions, with model-punished Ss showing relatively high resistnace to deviation. A combination of early-punishment training and exposure to a punished model was most effective in producing inhibition. Subsequent tests with problem-solving tasks, the solution of which had been demonstrated in the films, revelaed that Ss under model-rewarded and no-consequences conditions had learned from observation of the model; however, model-punished Ss did not perform significantly better in these tests than Ss who had not seen the film model. (Author)

AD-630 021 Fld. 5/10
ILLINOIS UNIV URBANA GROUP EFFECTIVENESS RESEARCH LAB
RACE AND BELIEF AS DETERMINANTS OF BEHAVIORAL INTENTIONS,
by Harry C. Triandis, and Earl E. Davis. 11 Dec 64, 12p. Contract Nonr-1834 (36), Proj. NR-177-472,

Unclassified report

Availability: Published in Journal of Personality and Social Psychology v2 n5 p715-25 Nov 1965. Copies to DDC users only.

Descriptors: (*Motivation, Culture), (*Behavior, Motivation), Semantics, Factor analysis, Personality

300 Ss responded, on 12 semantic and 15 behavioral differential scales, to 8 stimulus persons generated by all possible combinations of the characteristics Negro-white, male-female, pro- or con-civil-rights legislation. They also rated 35 political and civil rights issues on semantic differentials. A factor analysis of Ss, based on the covariances of their responses to variables, defined 11 types of Ss. 2 of these types were strongly prejudiced. One type of S showed 'conventional' prejudice; they were extremely sensitive to the race component when responding to the stimulus persons. Ss of the other type showed 'belief' prejudice; they were particularly sensitive to the beliefs of the stimulus persons. The relative importance of the race and belief components varied systematically with the degree of intimacy implied by clusters of behaviors which the Ss indicated they were willing to undertake with the stimulus persons. Thus, the Ss' behavioral intentions are a function of both personality and the type of behavioral intentions involved. (Author)

AD-630 024 Fld. 5/10
ARMY MEDICAL RESEARCH LAB FORT KNOX KY EXPERIMENTAL PSYCHOLOGY DIV
VIGILANCE FOR AUDITORY INTENSITY CHANGES AS A FUNCTION OF PRELIMINARY FEEDBACK AND CONFIDENCE LEVEL,
by Michel Loeb, and John R. Binford. 21 Jul 65, 22p. Proj. DA-3A014501B74C, Task 3A014501B74C01,
USAMRL 636

Unclassified report

Availability: Published in Human Factors p445-58 Oct 1964. Copies to DDC users only.

Descriptors: (*Attention, Auditory acuity), (*Auditory acuity, Intensity), Feedback, Psychometrics

Forty-eight subjects were asked to respond to occasional increments in a pulse train with ratings of certainty of signal occurrence for 20 min. Half (F) subjects were given feedback; half (NF) were not. In a second session all responded during an 80 min period with a simple response. In another, half responded with certainty ratings; half responded with a simple response. Finally, those who had responded with ratings responded simply and those who had employed a simple response made ratings. It was found that F subjects made fewer false responses and tended to make fewer detections in earlier sessions. In later sessions false responses were reduced for all. The usual progressive false response and detection reductions and latency increases were noted; when subjects employed ratings reductions in certainty were noted within sessions. It was concluded that the data support the detection theory model for vigilance for this type of task. (Author)

AD-630 169 Fld. 5/10
MONTANA STATE UNIV MISSOULA
SERIAL CVC LEARNING WITH VARIED M' BUT EQUAL A VALUES,
by Clyde E. Noble, Florence A. Showell, and Helen R. Jones. 1966, 2p. Contract Nonr-2960 (01)

Unclassified report

Prepared in cooperation with Georgia Univ., Athens; Contract Nonr-3677 (02).

Availability: Published in Psychon. Sci. v4 n6 p217-8 1966. Copies to DDC users only.

Descriptors: (*Learning, Verbal behavior), Analysis of variance, Semantics, Word association, Psychometrics, Memory

Two investigations were conducted on 140 Ss from widely-separated college populations to test the hypothesis that speed of acquisition in the serial verbal learning of consonant-vowel-consonant (CVC) material is a positive function of scaled meaningfulness (m'), even when the association values (a) of the lists are held constant. Appropriate norms for the relevant scale values were drawn

independently from the two geographical regions. Contrary to popular belief that m' and a are either identical or proportional measures, both experiments were consistent with the hypothesis as derived from Novle's curvilinear principle. It is thus a replicable fact that the memorization of CVCs selected from the high ends of the two scales depends more upon m' than upon a. (Author)

AD-630 177 Fld. 5/10
MARYLAND UNIV COLLEGE PARK DEPT OF PSYCHOLOGY
SOME REACTIONS OF JAPANESE UNIVERSITY STUDENTS TO PERSUASIVE COMMUNICATIONS,
by Elliott McGinnies. 1965, 10p. Contract Nonr-3720(01),Nonr-595(21) Proj. NR-171-250,
Unclassified report

Availability: Published in The Journal of Conflict Resolution v9 n4 p482-90 Dec 1965. Copies to DDC users only.

Descriptors: (*Social communication, Effectiveness), (*Attitudes, Culture), (*Public opinion, Japan), Students, Psychometrics, Applied psychology

AD-630 314 Fld. 5/10, 12/1
CFSTI Prices: HC $2.00 MF $0.50
PITTSBURGH UNIV PA GRADUATE SCHOOL OF BUSINESS
PSYCHOLOGICAL PREDICTIONS BASED ON BAYESIAN PROBABILITIES.
Technical rept.,
by Harry A. Clampett Jr.. Mar 66, 32p. Rept. no. TR-11,
Contract Nonr-624(14)
Unclassified report

Descriptors: (*Psychology, Mathematical prediction), (*Probability, Mathematical prediction), Decision making, Multivariate analysis, Mathematical models, Psychometrics

Bayesian analysis was applied to personnel predictions in comparison to traditional regression procedures. The main advantage the Bayesian approach has over regression techniques is freedom from the homogeneity-of-variance requirement. It was seen that when the assumption of homogeneous variance is violated, the Bayesian method yields more accurate predictions than the regression method. When the assumption is tenable, the Bayesian and regression approaches yield the same results. Along with algebraic and empirical analyses, computer simulation was used to contrast Bayesian and regression predictions of dichotomous budgeting decisions from scores on intelligence tests and inventories of orientation and personal values. (Author)

AD-630 333 Fld. 5/10
CFSTI Prices: HC $2.00 MF $0.50
MASSACHUSETTS UNIV AMHERST
EXPERIMENTS ON THE EFFECTS OF INPUT VARIABLES ON MULTI-TARGET ALPHABETIC DISPLAYS.
Technical documentary rept.,
by Warren H. Teichner, Edna Dahlquist, Nancy Eddy, and Sanford Pesner. Jul 63, 43p. Contract AF 19(628)-290, Proj. AF-9674, Task 967404, ESD TDR-63-546 ,N63 22926
Unclassified report

Descriptors: (*Visual signals, Perception), (*Psychometrics, Visual signals), Memory, Analysis of variance, Reaction (Psychology), Visual perception, Man-machine systems

The accuracy of reporting the data from briefly-exposed, multi-target symbolic displays in which each display response pair within a series of successive displays is an independent event was shown to be inversely related to the display load and the ordinal position of the display counting back from the last one seen. It was also found that accuracy of report was poorer when a report was required to each display than when the response rate was lower even though at the lower rates, S could not anticipate when the report would be required. The accuracy of report was not affected by the distribution of loads in the display series nor was it affected by the display presentation rate as is the case in sequentially dependent series. (Author)

AD-630 391 Fld. 5/10, 12/1
CFSTI Prices: HC $1.60 MF $0.50
NAVAL AIR DEVELOPMENT CENTER JOHNSVILLE PA AEROSPACE MEDICAL RESEARCH DEPT
PSYCHOPHYSICAL METHODOLOGY III. DEDUCTIONS FROM THE ASSUMPTION THAT A CUMULATIVE SYMMETRICAL DISTRIBUTION UNDERLIES THRESHOLD PHENOMENA,
by Robert M. Herrick. 31 Dec 65, 18p. Rept. no. NADC-MR-6515,
Task R360-FR-102/2021/R01-101-01,
Unclassified report

Descriptors: (*Psychophysiology, *Distribution functions), Statistical analysis, Numerical analysis, Thresholds (Physiology), Probability, Measure theory, Psychometrics

The phi-gamma and quantal hypotheses are special cases of the hypothesis of a cumulative symmetrical distribution. Assuming any cumulative symmetrical distribution it follows that: (a) a descending method of limits (DML) threshold distribution is a mirror image of an ascending method of limits (AML) threshold distribution; (b) the DML mean threshold, M sub D, is higher than the AML mean threshold, M sub A; (c) M sub A + M sub D = S sub O + S sub n, where S sub O and S sub n are the stimuli associated with p values (probability of a 'Yes' response) of .00 and 1.00, respectively; (d) the median threshold of the method of constant stimuli is (S sub O + S sub n)/2, as is the mean threshold of the pooled AML and DML distributions. (Author)

AD-630 429 Fld. 5/10, 9/2
CFSTI Prices: HC $4.00 MF $1.00
LIBRASCOPE DIV GENERAL PRECISION INC GLENDALE CALIF
AN AXIOMATIC CONCEPTUAL FRAMEWORK FOR ASSOCIATION THEORY.
Final rept.,
by Richard F. Reiss. Dec 65, 135p. Contract AF 49(638)-1236, Proj. AF-9769, AFOSR 66-0597
Unclassified report

Descriptors: (*Psychology, *Word association), Learning, Transfer of training, Sequences, Functions, Set theory, Automata, Mathematical logic

A partially developed axiomatic system, called the SSF frame (state-space-function framework), is described, and is intended for use in formulating a general theory of psychological phenomena, particularly a theory based on associationist concepts. The chief primitive entities of the system are 'states,' 'moments of time,' and 'occurrences' of a state 'at' various moments of time. A class of objects, 'bases,' is introduced for particular groups of states to enable the empirical interpretation of a 'real object' that can have or be in various observed states at various times. The base of a space is a unique object; there cannot be two or more bases in the same space and, by definition, the base of a space cannot be in two states at the same moment. A relation called an 'alinement' enables consideration of the relations between the spaces of x and y. The framework is deterministic; all functions are divided into 'formal' and 'causal,' the latter derived from the former by means of pairing and special interpretations. A main dichotomy of causal functions is that of 'first-order' vs. 'second-order' types. The notion of a 'sequential' deterministic system is developed that is consistent with the conceptual framework of state spaces and causal functions. The fundamental temporal property of a causal connection, the 'propagation delay,' is introduced and related with the delays of causal functions. The structure of a sequential function is characterized by 'autopaths' in the co-domain corresponding to subsets of the domain, namely those subsets defined by points in A for a function f:AXB - B. (Author)

AD-630 453 Fld. 5/10, 5/9
CFSTI Prices: HC $1.00 MF $0.50
DELAWARE UNIV NEWARK
RESEARCH ON PSYCHIATRIC EFFECTIVENESS OF FUTURE WEAPONS SYSTEMS CREWS.
Terminal technical rept., Jun 62-Aug 65,
by W. W. Haythorn, and J. T. Lanzetta. Aug 65, 23p. Contract Nonr-2285(04), NAVMED MF022.01.03-1002
Unclassified report

Descriptors: (*Military personnel, Stress (Psychology)), (*Stress (Psychology), Military personnel), Sensory deprivation, Psychiatry, Weapon systems, Social psychology, Military psychology, Personality, Motivation, Performance (Human)

In project argus, three classes of stress are discussed as of primary importance: those of (1) sensory reduction, (2) social isolation, and (3) interpersonal friction.

AD-630 475 Fld. 5/10, 5/9
CFSTI Prices: HC $4.00 MF $0.75
ISTITUTO NAZIONALE DI OTTICA FLORENCE (ITALY)
PROBLEMS RELATED TO VISUAL PERFORMANCE OF PILOTS.
Annual summary rept. 1 Dec 64-30 Nov 65,
by Adriana Fiorentini, and Lucia Ronchi. 20 Dec 65, 112p. Contract AF 61(052)-850,
Unclassified report

Descriptors: (*Pilots, Visual perception), Retina, Vision, Adaptation (Physiology), Italy, Reliability, Light

The report is divided into four sections. The first section is devoted to the study of (1) the small eye movements during voluntary monocular fixation of a bright point in a completely dark field, and of the determiners of these movements, (2) the autokinetic movements of the point and their possible relationships with the eye movements and (3) the perceived direction of a bright point as a function of retinal locus. Fixation of a point fixed in the visual field is compared with fixation of a point whose image is stabilized on the retina and with attempted fixation in the dark. The second part deals with some aspects of the perception of light signals. The third part deals with the reliability of electroretinographic response, in relation to changes in recording resistance, influence to previous exposure to sunlight, and lack of centrifugal control. In the fourth session the response of the eye to a step pattern of illumination is described in terms of the increment threshold for a small light patch added to the pattern at various distances from the illumination step. (Author)

AD-630 170 See Fld. 5/9

AD-630 176 See Fld. 5/7

AD-630 275 See Fld. 5/9

AD-630 336 See Fld. 9/4

AD-630 428 See Fld. 9/4

AD-630 478 See Fld. 17/2

5/11. SOCIOLOGY

AD-630 061 Fld. 5/11
RUTGERS-THE STATE UNIV NEW BRUNSWICK N J DEPT OF PSYCHOLOGY

JAPANESE VALUES AND THE DEMOCRATIC PROCESS.
Technical rept.,
by F. Kenneth Berrien. 30 Jul 64, 11p. Rept. no. TR-19,
Contract Nonr-404 (10),
Unclassified report

See also AD-422 702, AD-432 357.

Availability: Published in Journal of Social Psychology v68 p129-38 1966. Copies to DDC users only.

Descriptors: (*Sociology, Japan), (*Political science, Japan), (*Japan, Sociology), (*Students, Behavior), Acceptability, Public opinion, Culture

In an effort to probe Japanese values after a period of some 15 years experience under the democratic constitution, a research study was mounted having two prongs: one behavioral, the other attitudinal. The value patterns of Japanese college students were explored with the Edwards Personal Preference Schedule for which comparable American norms were already available. Officials in 50 villages and small cities were interviewed concerning the organization and duties of volunteer firemen. The latter were compared with data obtained from 58 volunteer companies located in New Jersey. The evidence from the students (although different in kind from the fire-company data) converges on a general inference that the Japanese become ego involved with community affairs less readily than do Americans. The students are less interested than Americans in assuming leadership positions, and in providing help and assistance to their friends. The volunteer fire companies have shown less initiative and autonomy than their American counterparts and appear to have been directed fro the upper levels of the hierarchy to organize themselves in specific ways. The Japanese villages and small towns appear to have been dependent upon higher authority to give them guidance if not more direct orders.

AD-630 148 **See Fld. 12/2**

Field 6-BIOLOGICAL AND MEDICAL SCIENCES

6/1. BIOCHEMISTRY

AD-629 755 Fld. 6/1, 6/13
PRAIRIE REGIONAL LAB SASKATOON (SASKATCHEWAN)
THE INTRACELLULAR AMINO ACID POOL OF CANDIDA UTILIS DURING GROWTH IN AND CONTINUOUS FLOW CULTURES,
by P. S. S. Dawson. 16 Mar 65, 16p.
NRC 8715
Unclassified report

Availability: Published in Biochemica et Biophysica Acta v111 p51-66 1965. Copies to DDC users only.

Descriptors: (*Candida, Amino acids), (*Amino acids, Metabolism), Growth, Culture media, Gas chromatography, Canada

The amino acid pool extracted from cells of Candida utilis, grown on simple chemically defined media by batch and chemostat methods, was investigated. The spectrum of the amino acids in the pool was significant as a register of the cell metabolism. The composition of the pool was found to be related to the medium, to the growth rate, and to the environmental conditions. The relationship of the pool to cell regulation i discussed. (Author)

AD-629 825 Fld. 6/1, 7/3
STANFORD UNIV CALIF DEPT OF GENETICS
OPTICAL RESOLUTION OF D,L AMINO ACIDS BY GAS CHROMATOGRAPHY AND MASS SPECTROMETRY,
by B. Halpern, J. W. Westley, Ingilt von Wredenhagen, and Joshua Lederberg. 9 Aug 65, 6p.
Contract AF-AFOSR-886-65 ,PHS-04270
AFOSR 65-2831
Unclassified report

Research supported in part by NASA, Grant NASA-644618-33.

Availability: Published in Biochemical and Biophysical Research Communications v20 n6 p710-4 1965. Copies to DDC users only.

Descriptors: (*Amino acids, Molecular rotation), (*Molecular rotation, Amino acids), (*Gas chromatography, Amino acids), (*Mass spectroscopy, Amino acids), Stereochemistry, Labeled substances, Optical properties

AD-629 845 Fld. 6/1
FLORIDA STATE UNIV TALLAHASSEE INST OF MOLECULAR BIOPHYSICS
MANGANESE-CATALYZED OXIDATIONS OF 2,3-DIKETOGULONATE.
Revised ed.,
by Peter H. Homann. 14 Jun 65, 13p. Contract AF-AFOSR-62-190 ,AF-AFOSR-662-64
AFOSR 65-2859
Unclassified report

Revision of manuscript submitted 22 Mar 65.

Availability: Published in Biochemistry v4 n9 p1902-11 1965. Copies to DDC users only.

Descriptors: (*Ketones, Oxidation), (*Sugar acids, Oxidation), (*Photochemistry, Sugar acids), (*Manganese, Photochemistry), Anthoxanthin pigments, Chloroplasts, Photosynthesis, Herbicides, Peroxidase, Oxidoreductases

Autoxidations of 2,3-diketogulonate can be induced by light and a sensitizing dye or by chemical means in the dark provided manganous ions are present in the reaction mixture. 3- (p-Chlorophenyl)-1,1-dimethylurea specifically stimulates the flavin-sensitized photoreaction, whereas the product formed from 3- (p-chlorophenyl)-1,1-dimethylurea by a flavin-sensitized photooxidation usually acts as an inhibitor. The action of manganese as a catalyst is discussed on the basis of the mechanism of manganese catalysis in certain peroxidase-oxidase reactions as proposed by I. Yamazaki and L. H. Piette (Biochim. Biophys. Acta 77, 47 (1963)). Trivalent manganese appears to be an essential intermediate chain carrier in all oxidations of 2,3-diketogulonate studied. The surprising specificity of the Mn (II)-Mn (III) couple to catalyze the oxidations of 2,3-diketogulonate is very probably a result of its oxidation-reduction potential, which allows the oxidation of Mn (II) by O2 (-) radicals to supplant chain -breaking removals of O2 (-). A chelation by 2,3-diketogulonate may enable Mn (III) to accomplish efficiently a splitting of the 2,3-diketogulonate molecule by attracting an electron. (Author)

AD-629 848 Fld. 6/1
STATE UNIV OF NEW YORK STONY BROOK COLL OF ENGINEERING
KINETICS OF PROTEIN SYNTHESIS BY POLYRIBOSOMES,
by I. Gerst, and S. N. Levine. 15 Oct 64, 24p.
Contract Nonr-4006 (00) ,AF-AFOSR-667-64
AFOSR 65-2153
Unclassified report

Availability: Published in J. Theoret. Biol. v9 p16-36 1965. Copies to DDC users only.

Descriptors: (*Ribosomes, Metabolism), (*Proteins, Biosynthesis), (*Biosynthesis, Reaction kinetics), Ribonucleic acids, Concentration (Chemistry), Theory, Differential equations, Enzymes

A detailed deterministic model for the kinetics of protein synthesis is developed on the assumption that the kinetics of the system depends linearly on the messenger RNA concentration. While the concentration of such components as adaptor RNA and ribosomes are regarded as constant, the messenger RNA input is taken to be time dependent and the analysis is given for both step and ramp inputs. It is shown that the theory predicts a nonlinear build-up in protein concentration followed by a linear phase in agreement with some experimental results. The slope of the linear portion corresponds to the rate of messenger RNA production. (Author)

AD-630 145 Fld. 6/1
EDSEL B FORD INST FOR MEDICAL RESEARCH DETROIT MICH
COMPARATIVE BIOCHEMISTRY OF SUCCINATE DEHYDROGENASE: FORMS AND FUNCTIONS,
by Thomas P. Singer. 1965, 35p. Contract Nonr-1656 (00) ,NSF-G20457
Unclassified report

Research supported in part by U. S. Public Health Service, Grant PHS-HE-01995.

Availability: Published in Oxidases and Related Redox Systems v1/2 p448-81 1965. Copies to DDC users only.

Descriptors: (*Oxidoreductases, Biochemistry), Chemical properties, Mammals, Yeasts, Plants (Botany), Invertebrates, Bacteria, Micrococcus, Escherichia coli, Mitochondria, Catalysis, Reaction kinetics, Anthoxanthin pigments, Succinates, Oxidation, Enzyme inhibitors

Topics include: variations in the properties of succinate dehydrogenase from different species of mammals, yeast, higher plants, invertebrates, and bacteria; multiple forms of succinate dehydrogenate from a single cell type, with special attention to the examples of Escherichia coli and yeast.

AD-630 187 Fld. 6/1
KAROLINSKA INSTITUTET STOCKHOLM (SWEDEN)
X-RAY DIFFRACTION STUDIES ON PERIPHERAL NERVE MYELIN,
by G. Hoglund, and H. Ringertz. 27 Dec 60, 7p.
Contract AF 61 (052)-21,
AFOSR 2133
Unclassified report

Availability: Published in Acta physiol. Scand. v51 p290-5 1961. Copies to DDC users only.

Descriptors: (*Nerve fibers, Lipids), (*Lipids, X-ray diffraction analysis), Molecular structure, Polymers, Fishes, Birds, Amphibians, Mammals, Embryos, Sweden

The dimension of the radial repeating unit was measured on peripheral nerve from 15 species belonging to 4 vertebrate classes. In the fishes the dimension was 161 plus or minus 3A and in the birds 182 plus or minus 5A. In the mammalian and amphibian species the dimensions were in agreement with earlier work (185 plus or minus 3A, and 171 plus or minus 3A, respectively). Diffraction patterns from brachial plexus nerves of sheep fetuses were obtained from a gestation age of approximately 90 days. Weak lines indicating a lower number of regularly arranged radial repeating units compared to older fetuses were obtained from fetuses between 90 and 105 days gestation age. The diffraction patterns from fetuses older than approximately 105 days gestation age were similar to those from peripheral nerves of adult sheep. (Author)

AD-630 189 Fld. 6/1, 6/3
CFSTI Prices: HC $1.10 MF $0.50
ARCTIC AEROMEDICAL LAB FORT WAINWRIGHT ALASKA

COMPOSITION OF BLACK BEAR MILK.
Rept. for 6 Jan-1 Sep 65,
by Raymond J. Hock, and Anna M. Larson. Jan 66, 10p. Rept. no. AAL-TR-65-21, Proj. AF-8237, Task 823702,
Unclassified report

Descriptors: (*Mammals, Milk), (*Milk, Chemical analysis), Fats, Proteins, Lactose, Minerals

An analysis of black bear (Ursus americanus Pallas) milk showed that the total solids, fat and protein were much higher and the lactose lower than either cow or human milk. In comparison with polar bear (Thalarcotos maritimus), the black bear milk was lower in fat, protein and total calories. (Author)

AD-630 331 Fld. 6/1
CFSTI Prices: HC $2.60 MF $0.50
NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF
THE INCORPORATION OF TRITIUM FROM THYMIDINE INTO PROTEINS OF THE MOUSE,
by Bernard J. Bryant. 21 Jan 66, 26p. Rept. no. USNRDL-TR-971, NAVMED MR005.08-1200-2
Unclassified report

Descriptors: (*Thymidines, Tracer studies), (*Tritiated compounds, Proteins), (*Proteins, Biosynthesis), Tritium, Desoxyribonucleic acids, Tissues (Biology), Labeled substances, Amino acids, Nuclei (Biology), Cytoplasm, Autoradiography, Chromatographic analysis, Mice

Tritium from methyl-3H-Thymidine was found to be incorporated into proteins in mice. This incorporation in the mouse as a whole represented between 1 and 10% of the injected tritium. Tritiated water was not responsible for the labeling. Transmethylation reactions were proposed as a means whereby certain amino acids might have acquired the tritium from thymidine at some stage of its catabolysis. The initial (2-hour) ratios of DNA to protein tritium activities per mg wet tissue ranged from 5 in two tissues of low DNA synthetic activity (pancreas, liver) to 35-40 in two tissues of high DNA synthetic activity (spleen, small intestine). Labeled nuclear protein was coincident with labeded DNA in nuclei, where it constituted less than 2.5% of the total tritium. The significance of the findings was discussed. (Author)

AD-630 388 Fld. 6/1, 6/16
ARMY RESEARCH INST OF ENVIRONMENTAL MEDICINE NATICK MASS
DISTRIBUTION OF LIPIDS IN RATS FED 1,3-BUTANEDIOL,
by M. A. Mehlman, D. G. Therriaut, W. Porter, G. S. Stoewsand, and H. A. Dymsza. 27 Sep 65, 4p.
Unclassified report

Prepared in cooperation with Army Natick Labs, Natick, Mass. Food Div.

Availability: Published in The Journal of Nutrition v88 n2 p215-8 Feb 66. Copies to DDC users only.

Descriptors: (*Butanols, Diet), (*Lipids, Metabolism), Liver, Blood plasma, Adipose tissue, Fats, Tissue extracts, Nutrition, Cholesterol, Esters, Chromatographic analysis, Rats

Quantitative thin-layer chromatography was used to measure the level of individual lipid components of liver, plasma and adipose tissue in rats fed 1,3butanediol (BD) as a replacement of 'natural' carbohydrate. The addition of 20% BD to diets containing either 10 or 30% fat resulted in a slight increase in liver neutral lipids, specifically, triglycerides and cholesterol esters. Phospholipid and cholesterol levels were not affected by an increase in dietary fat or BD. Plasma levels of non-esterified fatty acids, triglycerides and cholesterol esters were also higher as a result of increases in dietary fat or supplementation with BD. Addition of BD to either the 10 or 30% fat diet resulted in a highly significant decrease in epididymal fat. (Author)

AD-630 178 **See Fld. 6/5**

AD-630 386 **See Fld. 6/16**

6/3. BIOLOGY

AD-629 758 Fld. 6/3
ATLANTIC REGIONAL LAB HALIFAX (NOVA SCOTIA)
ZUR KENNTNIS DES SPHAGNUM ANGERMANICUM IN EUROPA,
by W. S. G. Maass. 1965, 14p.
NRC 8719
Unclassified report

Availability: Published in Svensk Botanisk Tidskrift v59 n3 p332-44 1965. Copies to DDC users only.

Descriptors: (*Plants (Botany), Europe), Morphology (Biology), Ecology, Distribution, Norway, North America

Sphagnum angermanicum, a much neglected species previously described by Melin (1919), has been reconsidered as a bryophyte which is well separated from all other Sphagnum species of the Acutifolium-group, although it shows a certain relationship both with S. plumulosum and S. molle. Several new localities are reported from Europe, where it has not been known except from its type locality. The species seems to be fairly abundant in southern Norway, while the stations in eastern North America make it an amphiatlantic species. Among the forms of S. molle Sulliv. var. limbatum Warnst., f. formosum Warnst. is shown to be a synonym of S. angermanicum. Also Eaton and Faxon's Sphagna borealiamericana Nos. 56 and 57 belong here. The habitats of S. angermanicum are described, and it is expected that this will trigger a series of further discoveries in northwestern Europe. (Author)

AD-629 854 Fld. 6/3
CHICAGO UNIV ILL COMMITTEE ON MATHEMATICAL BIOLOGY
SOME COMMENTS ON RE-ESTABLISHABILITY,
by Robert Rosen. 1964, 4p. Contract AF-AFOSR-9-65,
Unclassified report

Availability: Published in Bulletin of Mathematical Biophysics v27 p11-4 1965. (Special issue). Copies to DDC users only.

Descriptors: (*Biophysics, Graphics), (*Graphics, Biophysics), Time-lag theory

The present note consists of two separate but related parts. In the first, a new graph-theoretic proof is presented that an (M,R)-system must always contain a nonre-establishable component. The second considers some questions concerning the relation between reestablishability and the time-lag structure in (M,R)systems. It is supposed that the reader is familiar with the terminology of the author's previous work on (M,R)-systems, particularly R. Rosen, Bull. Math. Biophysics, 20, 245-260, 1958. (Author)

AD-629 947 Fld. 6/3
USAF EPIDEMIOLOGICAL LAB LACKLAND AFB TEX
ECTOPARASITES FROM RATTUS NORVEGICUS (ERXLEBEN) ON IWO JIMA, VOLCANO ISLANDS.
Scientific note,
by Warren F. Pippin, and T. Shimada. 1964, 4p.
Unclassified report

Availability: Published in Journal of Medical Entomology v2 n4 p384 Jan 10 1966. Copies to DDC users only.

Descriptors: (*Parasites, Rats), (*Pacific Ocean Islands, Parasites), Volcano islands, Disease vectors, Leptospira icterohaemorrhagiae

During the period 1 January - 30 September 1962 several visits were made to the island of Iwo Jima where ectoparasites were collected from 60 specimens of Rattus norvegicus. Five species of ectoparasites were found on the rats. They are Echinolaelaps echidninus (Berlese), Ornithonyssus bacoti (Hirst), Polyplax spinulosa (Burmeister), Xenopsylla cheopis (Rothschild) and Haemolaelaps sp. A total of 658 ectoparasties were removed from the rats. E. echidninus was the most common species found, accounting for 61.7% of the total. The remainder included). bacoti, 25.6%, P. spinulosa, 10.5% and X. cheopis, 2.2%. A single specimen of Haemolaelaps was found on one rat. Eleven or 18.3% of the rats examined were negative for ectoparasites. The greatest number of ectoparasites found on any one rat was 128. Only one rat harbored as many as four species at the same time. (Author)

AD-629 963 Fld. 6/3, 8/1
ALLAN HANCOCK FOUNDATION UNIV OF SOUTHERN CALIFORNIA LOS ANGELES
FIVE COLLECTIONS OF CUMACEA FROM THE ALASKAN ARCTIC,
by Robert R. Given. 1965, 18p.
Unclassified report

Availability: Published in Arctic v18 n4 p213-29 Dec 1965. Copies to DDC users only.

Descriptors: (*Crustacea, Arctic regions), Arctic Ocean, Alaska, Distribution, Morphology (Biology), Plankton, Aquatic animals

The purpose of the study is to add to the knowledge of the cumacean fauna of the north polar area by presenting new collection data and, in some cases, to extend the known geographic ranges of well-known species.

AD-630 056 Fld. 6/3
PENNSYLVANIA UNIV PHILADELPHIA DEPT OF PHYSIOLOGY
MECHANICAL PROPERTIES OF VASCULAR TISSUE,
by Francoise M. L. Attinger, and Lysle H. Peterson. 1966, 1p. Contract Nonr-551 (18) ,PHS-HE-07762
Unclassified report

Availability: Published in Federation Proceedings v24 n2 Mar-Apr 1965. Copies to DDC users only.

Descriptors: (*Blood vessels, Mechanical properties), Arteries, Anatomy, Tissues (Biology), Elasticity, Abstracts

Isotropy of vascular wall is commonly assumed in current theories concerning the mechanical characteristics of the blood vessel. Three types of evidence are presented which indicate that the walls of femoral and carotid arteries are not isotropic. (1) Poisson ratio determinations of carotid arteries give values incompatible with isotropy. (2) In vivo, blind-sac preparations of arteries were observed to lengthen when submitted to internal pressure, although it has been demonstrated theoretically and experimentally (Fenn and Faucett, 'Tissue Elasticity' American Physiological Society, 1957 p. 154-167) that such is not the case for isotropic tubes. (3) The elastic moduli of artery walls are different tangentially and longitudinally as measured by stress-strain determinations. (Report quoted in its entirety)

AD-630 133 Fld. 6/3, 6/16
CFSTI Prices: HC $1.10 MF $0.50
ARCTIC AEROMEDICAL LAB FORT WAINWRIGHT ALASKA
HEART RATE OF BLACK BEARS IN RELATION TO AGE.
Rept. for 6 Jan-1 Sep 65,
by Raymond J. Hock. Jan 66, 10p. Rept. no. AAL-TR-65-20,
Proj. AF-8237, Task 823702,
Unclassified report

Descriptors: (*Mammals, Pulse rate), (*Pulse rate, Aging (Physiology)), Electrocardiography, Anesthetics

Records were made of heart rates of 4 black bears, 2 males and 2 females, ages 1 to 42 months, weighing 0.6 - 70 kg. In the large bears, succinylcholine chloride was administered intramuscularly. The cubs were held while syringe needles connected to an EKG machine were inserted subcutaneously. It appears there is a marked fall in heart rate in black bears with increasing age until adulthood is reached. Succinylcholine vs. handling without anesthetic does not appear to be a factor in the results. Rates seem high, especially those of the larger, older bears. Though rectal temperature was normal, the excitement incident to anesthetic injection and the convulsive nature of its onset of action must be considered as factors in elevation of heart rate. Thus it seems possible that heart rates of the young bears are more reliable and that decrease in heart rate with age is even more marked than shown. (Author)

AD-630 382 Fld. 6/3
ARMED FORCES INST OF PATHOLOGY WASHINGTON D C
A METHOD FOR THE COUNTING OF MITOCHONDRIA,
by G. F. Bahr, G. H. Herbener, and U. Glas. 14 Mar 65, 10p.
Unclassified report

Prepared in cooperation with Georgetown Univ., Washington, D. C. Medical Center. Contract AT (30-1)-3361.

Availability: Published in Experimental Cell Research v41 p99-108 1966. Copies to DDC users only.

Descriptors: (*Mitochondria, Counting methods), Cytochemistry, Liver, Laboratory equipment, Styrene plastics, Particles, Spheres, Electron microscopy, Test methods

A method for the determination of absolute numbers of isolated mitochondria in suspension, useful in biochemical and other studies, is presented. The nonvolatile solute of the suspension medium is exchanged for a volatile salt by dialysis; the addition of a suspension of polystyrene latex spheres of a known particle concentration serves as a dilution standard. The ratio of latex spheres to mitochondria is determined with the electron microscope and the absolute number of mitochondria extrapolated. The accuracy of the technique is demonstrated. Results of counting mitochondria with this technique also serve to ascertain the correctness of counts obtained with a Coulter Counter. Light microscopic counting procedures are considered unreliable. (Author)

AD-630 488 Fld. 6/3
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
DENDRITIC FIELDS OF RETINAL GANGLION CELLS OF THE RAT,
by Joel E. Brown. 1 Feb 65, 10p. Contract DA-36-039-AMC-03200 (E) ,NSF-GP-2495
Unclassified report

Prepared in cooperation with NIH grants PHS-MH -04737-05, PHS-NB-04897-02, NASA grant NsG-496, USAF contract AF 33 (615)-1747.

Availability: Published in Journal Neurophysiol. v28 p1091-1100 1965. Copies to DDC users only.

Descriptors: (*Retina, Rats), (*Ganglia, Retina), Nerve cells, In vivo analysis, Morphology (Biology), Nervous system, Physiology, Electrophysiology

Retinal ganglion cells of the rat were stained in vivo with methylene blue. Two classes of ganglion cells were found, based on the morphologies of the dendrites of the stained cells. The dendrites of one class of cells ('tight') penetrated deep into the inner plexiform layer and had a dense arborization. The dendritic arborization of the other class ('loose') was more sparse and was found in a more shallow region of the inner plexiform layer. No multilayered cells were observed. Speculatively, these two classes were identified with receptive field types previously found by electrophysiological techniques. Tentatively the tight cells might be those units with no demonstrable surround regions, and the loose cells those which have a center-surround type of organization. (Author)

AD-630 502 Fld. 6/3
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
RAT RETINAL GANGLION CELLS: RECEPTIVE FIELD ORGANIZATION AND MAINTAINED ACTIVITY,
by Joel E. Brown, and J. Aristides Rojas. 1 Feb 65, 18p. Contract DA-36-039-AMC-03200 (E), NSF-GP-2495
Unclassified report

Availability: Published in J. Neurophysiol. v28 p1073-90 1965. Copies to DDC users only.

Descriptors: (*Retina, Rats), (*Ganglia, Retina), Optic nerve, Stimulation, Illumination, Adaptation (Physiology), Response, Anesthesia, Barbiturates, Nerve impulses, Electrophysiology, Nervous system, Physiology

The receptive field organization of single retinal ganglion cells of the rat was studied. A cell was stimulated by a variety of configurations of moving and stationary stimuli displayed on a screen 16 inches from the eye. The responses of the cell were recorded with a low-impedance metal microelectrode from the axon of the cell in the optic nerve or optic tract. Two types of units were found: units which had concentrically arranged receptive fields with a central region which responded either to an increase (on) or a decrease (off) of illumination and a surround region which antagonized the responses of the central region, and units which had no demonstrable surround. In spite of extensive search no other types of receptive fields were found. The efficacy of the surround, when it was present, in antagonizing the center varied among the units. In addition, both on- and off-center units were either slow or fast in adapting to changes in illumination. The receptive field organization did not change very much with anesthetic doses of urethane and pentobarbital. The maintained activity of single retinal ganglion cells was studied in anesthetized and unanesthetized rats. In an unanesthetized rat the maintained activity of a single unit was more or less random. (Author)

AD-630 027 **See Fld. 8/6**

AD-630 028 **See Fld. 8/6**

AD-630 189 **See Fld. 6/1**

AD-630 479 **See Fld. 6/13**

6/4. BIONICS

AD-630 471 Fld. 6/4, 9/2
CFSTI Prices: HC $3.00 MF $0.50
ROME AIR DEVELOPMENT CENTER GRIFFISS AFB N Y INFORMATION PROCESSING BRANCH
STANDARDIZATION OF TYPEWRITER FONTS FOR AUTOMATIC READING.
Final rept., Feb 63-Sep 65,
by James F. Greenly. Mar 66, 56p. Proj. DW-63-48,
RADC TR-65-523
Unclassified report

Research performed in part by General Precision Lab., Pleasantville, N. Y., Contract AF 30 (602)-2642 and General Precision, Inc., Binghamton, N. Y. Link Div., Contract AF 30 (602)-3116.

Descriptors: (*Character recognition, Standardization), (*Reading machines, Effectiveness), Typewriters, Optical equipment components, Standards, Optical scanning, Reflection, Paper, Ink

The object was to provide engineering data in support of standardization of typewriter fonts and related features for optical scanning application. Primary emphasis was placed on investigation and evaluation of existing typewriter fonts and includes an evaluation of a type font developed by Subcommittee X3.1 on Character Recognition under American Standards Association Sectional Committee X3. Investigations were by computer programmed assessment of each font using a technique developed partly under Contract AF30 (602)-2642 (AD-404 846) sponsored by Rome Air Development Center and partly under continuing Link sponsored character recognition efforts (AD-623 613, -623 614, -623 621). Evaluations were accomplished by extending the vocabulary capacity of a Link Multifont Page Reader to permit machine reading of a significant volume of typewriter-prepared documents. Reject and error rates were determined in this manner for each of several type styles considered. (Author)

AD-629 789 **See Fld. 5/7**

AD-629 896 **See Fld. 7/4**

AD-630 125 **See Fld. 9/2**

6/5. CLINICAL MEDICINE

AD-629 870 Fld. 6/5
CFSTI Prices: HC $1.00 MF $0.50
DUKE UNIV DURHAM N C MEDICAL CENTER
INFLUENCE OF ARTERIAL OXYGEN TENSION ON APNEIC THRESHOLD FOR CARBON DIOXIDE IN NORMOTHERMIC AND HYPOTHERMIC DOGS.
Final rept. Nov 62-Nov 64,
by J. V. Salzano, and F. G. Hall. Dec 65, 14p. Contract AF 33 (657)-10279, Proj. AF-7164, Task 716404,
AMRL TR-65-211
Unclassified report

Descriptors: (*Hyperventilation, Thresholds (Physiology)), (*Respiration, Thresholds (Physiology)), Carbon dioxide, Oxygen, Dogs, Hypothermia, Arteries, Vapor pressure, Respiratory system

Anesthetized dogs were hyperventilated with various CO2-free gas mixtures containing 6-100% O2 at a rate of 16 l/min. for 4 minutes at normal and reduced body temperatures (28C). Arterial blood samples were withdrawn at the start of the first breath following the apneic period and analyzed for PCO2, PO2, and pH. The PaCO2 was used as an index of the respiratory threshold for PCO2 and designated as PTCO2. At both normal and reduced body temperatures the PTCO2 decreased when the PaO2 was lowered as a result of hyperventilation with a low oxygen gas mixture. The PTCO2 was highest when the PaO2 was highest following hyperventilation with 100% O2. The relationship between PaO2 and PTCO2 was alinear at both temperatures. During normothermia the slope of a plot of the mean values of the PTCO2-PaO2 relationship was steepest below a PaO2 of 35 mm Hg and in hypothermia the relationship was steepest below approximately 20 mm Hg PaO2. The results indicated no real apneic

threshold for PaCO2 during normothermia or hypothermia but rather one which directly is related to the PaO2. (Author)

AD-629 911 Fld. 6/5, 6/13
CFSTI Prices: HC $4.00 MF $1.00
DEPARTMENT OF THE ARMY WASHINGTON D C
(EXANTHEMATOUS) TYPHUS FEVER AND BRILL'S DISEASE (ETIOLOGY, PATHOLOGY, EPIDEMIOLOGY AND PREVENTION),
by P. F. Zdrodovskii. 3 Feb 66, 143p. Rept. no. i-8711,
TT 66-60761

Unclassified report

Trans. of mono. Sypnoi Tif i Bolezn Brillya (Etiologiya, Patologiya, Epidemiologiya i Profilaktika, Moscow, 1965 207p.

Descriptors: (*Rickettsia, Diseases), Etiology, Pathology, Epidemiology, Immunology, Fevers, Diagnosis, Embryonated egg technique, Disease vectors, Lice, Animals, Immunity, Vaccines, Mortality rates, Statistical data, Antigens + antibodies, Serodiagnosis, Toxins + antitoxins, Morphology (Biology), Toxicity, Reviews, USSR

The monograph contains basic data collected from the world literature and gained from original research on the etiology, pathology, immunology, epidemiology, and prevention of classical typhus fever compared with sporadic typhus, its recurrent form which corresponds to Brill's disease.

AD-629 967 Fld. 6/5
ARMY MEDICAL UNIT FORT DETRICK MD
Q FEVER. METHOD OF KENNETH R. DIRKS, M. D.,
by Kenneth R. Dirks. 1966, 2p.

Unclassified report

Availability: Published in Current Therapy p39-40 1966. Copies to DDC users only.

Descriptors: (*Coxiella, Diseases), Fevers, Immunity, Diagnosis, Therapy, Tetracyclines, Dosage, Serodiagnosis, Mortality rates

Contents: General measures; Specific therapy; Clinical course and prognosis; Specific diagnosis in convalescence; Mortality rate.

AD-629 970 Fld. 6/5
CFSTI Prices: HC $1.60 MF $0.50
ARMY MEDICAL BIOMECHANICAL RESEARCH LAB WALTER REED ARMY MEDICAL CENTER WASHINGTON D C
DORRANCE PROSTHETIC HANDS-LABORATORY EVALUATION.
Final rept.,
by John Hodge,Jr.. Jan 66, 12p. Rept. no. AMBRL-TR-6601,
Proj. DA-3A025601A821-01,

Unclassified report

Descriptors: (*Prosthetics, Hands), Specifications, Design, Standards

Two Dorrance, Size 2 hands were laboratory evaluated for functional characteristics, weight, and cyclic resistance. A comparison of the results with the No. 2 Size hand standards revealed some differences; however, these would not impair functioning of the hands. (Author)

AD-629 981 Fld. 6/5
HOSPITAL FOR SPECIAL SURGERY NEW YORK
COMPARATIVE STUDIES OF NEURORRHAPHY AND SUTURELESS PERIPHERAL NERVE REPAIR,
by Richard M. Braun. 1966, 4p.

Unclassified report

Availability: Published in SURGERY, Gynecology and Obstetrics v122 p15-8 Jan 1966. Copies to DDC users only.

Descriptors: (*Nerves, Surgical techniques), (*Surgical techniques, Nerves), Nervous system, Nerve fibers, Surgery, Surgical supplies, Acrylic resins, Collagen, Adhesives, Tissues (Biology), Histology, Rats

Sciatic nerve transections in rats and rabbits were created, repaired, and studied histologically. No significant difference in fiber healing pattern was seen in those nerves repaired by standard meticulous methods and those repaired with the aid of the dissecting microscope and 10-16 power magnification. Delayed repair did not effect an improved fiber pattern. The use of alkyl 2-cyanoacrylate adhesive was associated with an adverse tissue reaction. Inclusion of the cement between the nerve ends prevented repair. Tubulization technique can produce an excellent fiber pattern. A collagen film which has good strength, is mildly reactive, and can hold a suture at a distance from the cut nerve ends has proved useful for tubulization. Electrical stimulation studies on 12 repaired rabbit sciatic nerves showed no difference in nerve function following repair by standard or microsurgical neurorrhaphy. (Author)

AD-630 147 Fld. 6/5, 9/2
SYSTEM DEVELOPMENT CORP FALLS CHURCH VA
SIMULATED DESIGN OF A HOSPITAL PATIENT DATA SYSTEM,
by Harold H. Wilson. 1963, 6p.

Unclassified report

Availability: Published in Data Processing for Management Magazine of May 1963. Copies to DDC users only.

Descriptors: (*Data processing systems, Medicine), (*Medicine, Data processing systems), Hospitals, Medical research, Simulation, Design, Data, Personnel management, Medical personnel, Computers, Medical examination

AD-630 178 Fld. 6/5, 6/1
CALIFORNIA UNIV SAN FRANCISCO MEDICAL CENTER
ON THE VALENCY OF INCOMPLETE ANTI-RH ANTIBODIES,
by W. J. Mandy, I. L. Holmdahl, F. B. Lewis, and H. H. Fudenberg. 30 Mar 65, 9p. Contract Nonr-3656 (12),PHS-HE-05997 Proj. NR-105-308,

Unclassified report

Presented at the Annual Meeting of the American Association of Immunologists (Blood Groups Session), Atlantic City, New Jersey 13 April 1965.

Availability: Published in Clinical and Experimental Immunology v1 n1 p25-32 Jan 1966. Copies to DDC users only.

Descriptors: (*Rh incompatibility, Molecular association), (*Antigens + antibodies, Molecular association), (*Blood coagulation, Rh incompatibility), Blood chemistry, Erythrocytes

The univalency concept of the mechanism responsible for the failure of incomplete antibodies to produce direct agglutination of appropriate untreated red cells was investigated. Artificially produced univalent (hybrid) 7S antibodies were found to differ in serologic behaviour from incomplete anti-Rh antibodies of the same molecular size. The data suggest that the so-called 'univalent' anti-Rh antibody molecule is bivalent. (Author)

AD-630 383 Fld. 6/5
ARMED FORCES INST OF PATHOLOGY WASHINGTON D C DEPT OF OPHTHALMIC PATHOLOGY
DIRECT RUPTURE OF THE CHOROID,
by Gunther Kaufer, and Lorenz E. Zimmerman. 5 Oct 65, 2p.

Unclassified report

Availability: Published in Arch Ophthal v75 p384-5 Mar 1966. Copies to DDC users only.

Descriptors: (*Eye, Pathology), Histology, Diagnosis, Wounds + injuries, Ophthalmology

The occurrence of a large direct rupture of the choroid is reported, and its macroscopic and microscopic appearances are illustrated.

AD-630 385 Fld. 6/5
ARMED FORCES INST OF PATHOLOGY WASHINGTON D C
BURULI ULCERATION, A CLINICOPATHOLOGIC STUDY OF 38 UGANDANS WITH MYCOBACTERIUM ULCERANS ULCERATION.
Original articles,
by Daniel H. Connor and H. Fletcher Lunn. 13 Dec 65, 17p. Contract DA-MD-49-193-63-G101,

Unclassified report

Prepared in cooperation with Makerere Coll. Medical School, Kampala (Uganda).

Availability: Published in Arch path v81 p183-99 Mar 1966. Copies to DDC users only.

Descriptors: (*Mycobacterium, Ulcers), (*Integumentary diseases, Mycobacterium), Subsaharan Africa, Epidemiology, Children, Pathology, Extremities, Necrosis, Skin, Tissues (Biology), Toxicity, Histology

Integumentary ulceration caused by M ulcerans is an important disease in Uganda. It affects those who live along the Victoria Nile, but the reason for this is unknown. A current impasse in epidemiologic studies results from the fact that the natural reservoir of the organism is unknown. In Uganda, the ulcers are seen primarily in children and primarily on the extremities. Clinically, the infection begins as a small subcutaneous nodule, which ulcerates, leading to loss of skin and of subcutaneous tissues. The principal pathologic change is a peculiar necrosis characterized by a ghost outline of tissue structure in the necrotic area and by the absence of inflammation in adjacent viable tissue. This necrosis spreads contiguously, involving all structures in its path. It spreads upward through the dermis and epidermis, causing ulceration, but its widest excursion is in the panniculus, where it undermines the margin of the ulcer. After a delay which varies greatly from patient to patient, organization of the necrotic tissue begins, and healing follows. It is not yet known how the infection begins, but in the cases studied here the mycobacterial colonies were found only in necrotic tissue, and it is suggested that M ulcerans causes widespread necrosis by elaborating a toxic substance. (Author)

AD-630 415 Fld. 6/5
CFSTI Prices: HC $14.60 MF $1.00
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
THEORY AND PRACTICE OF IONIZED-AIR THERAPY,
by L. L. Vasilev. 6 Jan 66, 144p. Rept. no. FTD-TT-65-590,
TT 66-60830

Unclassified report

Unedited rough draft trans. of mono. Teoriya i Praktika Lecheniya Ionizirovannym Vozdukhom, Leningrad, 1951 132p.

Descriptors: (*Ionization, Therapy), (*Public health, Ionization), Air, Hygiene, Medical equipment, Physiology, USSR, Electrotherapy, Climatology

Contents: Natural ionization of air, its climatological and hygienic significance; Artificial ionization

of air, aeroion generators and counters; Therapeutic use of aeroionization (aeroiontherapy); Experimental bases of aeroiontherapy; Paths and mechanisms of the physiological effect of aeroions.

AD-630 480 Fld. 6/5
SCHOOL OF AEROSPACE MEDICINE BROOKS AFB TEX
CURRENT UNITED STATES AIR FORCE POLICY ON GLAUCOMA,
by Jed Lee Howard, W. Bruce Clark, James F. Culver, and Thomas J. Tredici. 27 Apr 65, 7p. Rept. no. SAM-TR-65-325, Proj. AF-7755,
Unclassified report

Availability: Published in Aerospace Medicine v36 n9 p878-80 Sep 1965. Copies to DDC users only.

Descriptors: (*Eye, Military medicine), Pathology, Air Force, Opthalmology, Visual acuity, Aviation personnel

The current United States Air Force glaucoma policy has been in effect since January 1963. In the intervening two years, 43 people have been returned to flying duties on waiver for: (1) Preglaucoma--Aircrew personnel with tensions of 22-29mm. Hg, full visual fields, normal funduscopy, and capability for quarterly follow-up were permitted to continue their flying military mission without medication. (2) Glaucoma--If the tension mounted 29 mm. Hg, there was early evidence of visual field loss, or the optic disc appeared cupped, grounding was initiated. Therapy with a sympathomimetic amine was instituted. Waiver for return to flying was considered by the Office of the Surgeon General on the recommendation of the consultation centers at Brooks Air Force Base, Tachikawa Air Force Base, or Wiesbaden Air Force Base attesting to the physiologic normalcy of the eyes. Flying with such medication was then permitted. The United States Air Force glaucoma policy, with the division of patients into preglaucoma and glaucoma categories, appears to warrant continued study, for the nation has gained experienced personnel in 43 flying positions and accumulated over 5000 hours of additional flying protection without paying the price of visual field loss or a single aircraft accident. (Author)

AD-629 865 See Fld. 6/18

AD-629 961 See Fld. 6/15

AD-629 962 See Fld. 6/18

AD-630 175 See Fld. 6/13

AD-630 292 See Fld. 15/6

6/6. ENVIRONMENTAL BIOLOGY

AD-629 887 Fld. 6/6, 2/2, 6/8
CFSTI Prices: HC $9.60 MF $0.75
HUDSON INST INC HARMON-ON-HUDSON N Y
HISTORICAL EXAMPLES OF ECOLOGICAL DISASTER. FAMINE IN RUSSIA 1921-22. FAMINE IN BECHUANALAND 1965,
Research rept.,
by Jean M. Ingersoll. Dec 65, 95p. Rept. no. HI-518-RR/A1,
Contract OCD-OS-62-218,
Unclassified report

Descriptors: (*Starvation, Disasters), (*Disasters, Ecology), (*Agriculture, Production), USSR, Union of South Africa, Food dispensing, History, Economics, Rainfall, Warfare, Epidemiology, Countermeasures

Russia was a predominantly agricultural nation in 1921, with 85% of the population engaged in farming some 250-295 million acres of land in a relatively limited area, the 'fertile triangle' of chernozem soils. Severe drought led to extensive crop failure in the spring and summer of 1921, and this added to the problems created by years of war and revolution in the face of which reconstruction of a viable economic system was only in the beginning stages, resulted in a starvation threat to some 30,000,000 people by late summer 1921. Chaotic postwar conditions, especially the deteriorated state of railways and port facilities, constituted the greatest obstacle to timely distribution of relief supplies. A more recent example of famine is given in the account of that presently occurring in Bechuanaland, Africa. Again drought is the main cause of the disaster. As in Russia, insufficiency of water at critical times is a chronic hazard and is the overriding limiting factor for agriculture.

6/7. ESCAPE, RESCUE AND SURVIVAL

AD-630 190 Fld. 6/7, 17/2.1
CFSTI Prices: HC $2.60 MF $0.50
ARCTIC AEROMEDICAL LAB FORT WAINWRIGHT ALASKA
AN/URT-21 LOCATOR BEACON JUMP TEST AND RECEPTION DISTANCES,
by John R. Schumann, and Walter W. Millard. Jan 66, 24p. Rept. no. AAL-TR-65-23, Proj. AF-8238, Task 823802,
Unclassified report

Descriptors: (*Radio beacons, Rescue beacons), (*Rescue beacons, Radio beacons), Flight testing, Parachute descents, Radio transmitters, Radio reception, Ranges (Distance), Performance (Engineering)

The AN/URT-21 Locator Beacon and riser antenna were installed in several different locations in the B-5 Back Style and AP28S-10 parachutes. Live and dummy drop tests were conducted at altitudes of 1500 to 5000 feet in temperatures of -5F to 29F. Monitoring stations at a distance of 2 to 28 miles from the drop zones reported signals heard from time of parachute deployment until ground contact was made. Air-crew members wore the back style parachute with the beacon installed between the pack tray and back cushion. A study of their subjective evaluation of the comfort of this parachute was conducted in F-102, B-47 and KC-135 aircraft. After simulating ejection procedures and flying duties, aircrew members reported very minor or no discomfort and no interference with flying duties. It is recommended that beacons be installed between the pack tray and back pad, that the beacon activating button be made of rubberized material, and that the activating cord be tied on the riser. (Author)

AD-630 466 Fld. 6/7, 6/14
CFSTI Prices: HC $1.10 MF $0.50
NAVAL AVIATION SAFETY CENTER NORFOLK VA
BODY-BUILD AND SURVIVAL IN EJECTIONS FROM NAVY AIRCRAFT,
by George T. Lodge. 1965, 10p.
Unclassified report

Descriptors: (*Survival, Physical fitness), (*Parachute jumping, Survival), (*Anthropometry, Survival), Aviation accidents, Naval aircraft, Escape systems (Aerospace), Ejection, Pilots

AD-630 485 See Fld. 13/10

6/8. FOOD

AD-629 887 See Fld. 6/6

6/12. MEDICAL AND HOSPITAL EQUIPMENT AND SUPPLIES

AD-629 969 Fld. 6/12
CFSTI Prices: HC $1.00 MF $0.50
ARMY MEDICAL BIOMECHANICAL RESEARCH LAB WALTER REED ARMY MEDICAL CENTER WASHINGTON D C
DESIGN OF THE FOAM IN PLACE SPLINT.
Final rept.,
by James T. Hill, and Donald R. Ingenito. Nov 65, 15p. Rept. no. AMBRL-TR-6516, Proj. DA3A025601A821-01,
Unclassified report

Descriptors: (*Medical supplies, Isocyanate plastics), Design, Foams, Fractures (Bone)

The design and development of a foam in place emergency splint for field use is described. The splint pack is comprised of a two component polyurethane foam resin system contained within a cushion backed plastic film envelope. In use, the foam components are mixed within the package and the envelope applied to the fractured limb. Within several minutes the foam hardens to form a well contoured weight bearing splint. (Author)

AD-630 166 Fld. 6/12
CFSTI Prices: HC $2.00 MF $0.50
HARRY DIAMOND LABS WASHINGTON D C
EXPERIMENTAL DETERMINATION OF PRESSURE-FLOW CHARACTERISTICS OF ARMY MEMBRANE OXYGENATOR, PROTOTYPES I AND II,
by George Mon. Jan 66, 29p. Rept. no. TM-65-52,
Proj. HDL-31000,
Unclassified report

Descriptors: (*Mechanical organs, Heart), (*Fluid amplifiers, Fluid flow), (*Oxygen equipment, Tests), Pressure, Performance (Engineering), Analysis, Oscillation, Gas flow, Membranes, Medical equipment, Army equipment

An analysis was made of the pressure-flow characteristics of prototypes I and II of the Army membrane oxygenator. This oxygenator was designed with the objective of extending the period of oxygenation from 2 or 3 hours, the present maximum use period for existing oxygenators, to many hours. In this analysis, water was substituted for blood and air for oxygen. This analysis considered only the effects on the water flow of the length of the flow path and of the input water pressure, and the effects on the water flow of the pressure, the frequency of pulsation, and the flow of the air. Test results indicated that, for a given test condition, an increase in the oscillation frequency of the flowing gas slightly decreases the flow rate of water, at least over the frequency range of 60 to 100 cpm; counter gas flow produces a significantly higher resistance to water flow than co-current flow; the flow rate of water is proportional to the pressure presented to the blood inlet of the oxygenator; an increase in the pressure of the flowing gas causes a decrease in the output flow of water; and a longer flow path has a higher resistance to flow than a shorter path. (Author)

AD-630 432 Fld. 6/12
CFSTI Prices: HC $1.00 MF $0.50
ARMY NATICK LABS MASS
LONG-TERM STORAGE STUDY OF DISINFECTANT, GERMICIDAL AND FUNGICIDAL.
Microbiological Deterioration series no. 8 (technical),
by Elizabeth Pillion, Morris R. Rogers, and Arthur M. Kaplan. Dec 65, 17p. Proj. DA-1C025601A031-04,
Unclassified report

Descriptors: (*Germicides, Storage), (*Fungicides, Storage), Stability, Cold weather tests, Tropical tests, Desert tests, Environmental tests, Phenols, Effectiveness

A five-year storage test was conducted on Disinfectant, Germicidal and Fungicidal, Phenolic,

Dry-Type, Specification MIL-D-51061 in order to obtain data on storage stability and performance under adverse climatic conditions. The storage sites were located at Fort Churchill, Canada (arctic, cold-dry), Maynard, Massachusetts (temperate, cold-wet), Yuma, Arizon (desert, hot-dry) and Panama Canal Zone (tropic, hot-wet). After five years of storage in arctic and temperate climates the disinfectant showed no significant change in appearance or composition, and no decrease in bactericidal activity. The samples exposed in the hot environments showed varying degrees of alteration evidence by darkening and liquefaction of the dry powder. Bactericidal activity was lower than control values but sufficient to meet the performance requirements. (Author)

AD-630 483 Fld. 6/12
CFSTI Prices: HC $1.60 MF $0.50
DIRECTORATE OF SCIENTIFIC INFORMATION SERVICES OTTAWA (ONTARIO)
AN APPARATUS FOR THE STUDY OF RESPIRATORY GAS METABOLISM IN SMALL ANIMALS,
by M. D. Hacaniuk. Jan 66, 11p. Rept. no. T-3-Ukr,
TT 66-60832

Unclassified report

Trans. of Fiziologichnyi Zhurnal (USSR) v1 n3 p123-9 1955.

Descriptors: (*Respiration, Medical equipment), (*Metabolism, Gases), Carbon dioxide, Oxygen, Laboratory equipment, Animals, Volumetric analysis, USSR

6/13. MICROBIOLOGY

AD-629 771 Fld. 6/13
PRAIRIE REGIONAL LAB SASKATOON (SASKATCHEWAN)
CONTINUOUS PHASED GROWTH, WITH A MODIFIED CHEMOSTAT,
by P. S. S. Dawson. 24 Feb 65, 15p.
NRC 8549

Unclassified report

Availability: Published in Canadian Journal of Microbiology v11 p893-903 1965. Copies to DDC users only.

Descriptors: (*Candida, Growth), Amino acids, Culture media, Chromatographic analysis, Photomicrography, Canada

A modified chemostat is described which may be used to maintain a continuously phased population in the culture for periods of many months. Preliminary results with Candida utilis show that changes in the amino acid pool occur over the cell cycle, and that these changes alter with growth rate. The significance of the method and its relationship to chemostat culture are outlined. (Author)

AD-629 965 Fld. 6/13
ILLINOIS UNIV URBANA DEPT OF MICROBIOLOGY
CHARACTERIZATION OF A THERMOPHILIC BACTERIOPHAGE FOR BACILLUS STEAROTHERMOPHILUS,
by Grady F. Saunders. 17 Jul 65, 10p. Contract NSF-GB-4, Proj. NR-108-330,

Unclassified report

Availability: Published in Journal of Bacteriology v91 n1 p340-8 Jan 1966. Copies to DDC users only.

Descriptors: (*Bacteriophages, Physical properties), Chemical properties, Temperature, Morphology (Biology), Molecular weight, Density, Purification, Electron microscopy, Desoxyribonucleic acids, Amino acids, Electrophoresis, Absorption spectrum

The biological and physical-chemical properties of the thermophilic bacteriophage TP-84 were investigated. TP-84 was shown to be lytic for 3 of 24 strains of Bacillus stearothermophilus tested over the temperature range of 43 to 76 C. The latent period of TP-84 on B. stearothermophilus strain 10 was 22 to 24 min. TP-84 has a hexagonal head, 53 millimicrons in diameter and 30 millimicrons on a side; its tail is 130 millimicrons long and 3 to 5 millimicrons wide. The phage has a sedimentation coefficient of 436, and bands at a density of 1.508 g/cc in CsCl (pH 8.5). The diffusion coefficient of TP-84 was calculated to be 6.19 X 10 to the minus 8th power cm sq/sec. From the sedimentation and diffusion data, a particle molecular weight of 50 million daltons was calculated for TP-84. The phage DNA has a base composition of 42% guanine + cytosine, deduced from buoyant density and melting temperature measurements. (Author)

AD-629 966 Fld. 6/13
ILLINOIS UNIV URBANA DEPT OF MICROBIOLOGY
RIBONUCLEIC ACID AND RIBOSOMES OF BACILLUS STEAROTHERMOPHILUS,
by Grady F. Saunders, and L. Leon Campbell.
23 Aug 65, 10p. Contract NSF-GB-4, Proj. NR-108-330,

Unclassified report

Presented at the Annual Meeting of the American Society for Microbiology (65th), Atlantic City, N. J. 25-29 April 1965.

Availability: Published in Journal of Bacteriology v91 n1 p332-9 Jan 1966. Copies to DDC users only.

Descriptors: (*Thermal stability, Bacteria), (*Ribonucleic acids, Thermal stability), (*Ribosomes, Thermal stability), Growth, Temperature, Culture media, Magnesium compounds, Chlorides, Ions, Escherichia coli, Amino acids

The ability of some thermophilic bacteria to grow at temperatures as high as 76 C emphasizes the remarkable thermal stability of their crucial macromolecules. An investigation of the ribonucleic acid (RNA) and ribosomes of Bacillus stearothermophilus was conducted. Washed log-phase cells were disrupted either by sonic treatment or by alumina grinding in .01 m MgCl2-.01 m tris- (hydroxymethyl) aminomethane buffer, pH 7.4 (TM buffer). Ultracentrifugal analysis revealed peaks at 72.5S, 101S, and 135S, with the 101S peak being the most prominent. By lowering the Mg (++) concentration to .001 m, the ribosome preparation was dissociated to give 40S, 31S, and 54S peaks. These in turn were reassociated in the presence of .01 m Mg (++) to give the larger 73S and 135S particles. When heated in TM buffer, Escherichia coli ribosomes began a gradual dissociation at 58 C, and at 70 C underwent a large hyperchromic shift with a T sub m at 72.8 C. In contrast, B. stearothermophilus ribosomes did not show a hyperchromic shift below 70 C; they had a T sub m of 77.9 C. The thermal denaturation curves of the 4S, 16S, and 23S RNA from both organisms were virtually identical. (Author)

AD-630 175 Fld. 6/13, 6/5
CFSTI Prices: HC $4.00 MF $1.00
ARMY BIOLOGICAL LABS FREDERICK MD
IMMUNOFLUORESCENCE, AN ANNOTATED BIBLIOGRAPHY. I. BACTERIAL STUDIES,
by Warren R. Sanborn. Dec 65, 125p. Rept. no. Miscellaneous Pub-3,

Unclassified report

Descriptors: (*Fluorescent antibody techniques, Bibliographies), (*Bacteria, Fluorescent antibody techniques), Abstracts, Immunology, Actinomycetales, Bacillaceae, Miyagawanella, Brucellaceae, Corynebacteriaceae, Enterobacteriaceae, Tactobacillaceae, Micrococcaceae, Mycoplasma, Neisseriaceae, Pseudomonadales, Spirillaceae, Spirochaetales

This volume is one of a series of six annotated bibliographies on various aspects of immunofluorescence and its use. Citations cover the period 1905 through 1962. Volume 1 contains 337 annotated literature citations, arranged according to major subject areas, and a complete author index. (Author)

AD-630 395 Fld. 6/13
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF BIOLOGICAL SCIENCES
A NEW SPECIES OF HELIOCHONA, H. PSYCHRA N. SP. (CILIATA: CHONOTRICHIDA), FROM NUWUK LAKE, ALASKA,
by Hitoshi Matsudo, and John Luther Mohr.
1965, 5p. Contract Nonr-228 (19), Proj. NR-307-270,

Unclassified report

Availability: Published in The Journal of Protozoology v12 n4 p523-7 1965. Copies to DDC users only.

Descriptors: (*Ciliata, Morphology (Biology)), Arctic regions, Aquatic animals, Crustacea, Parasites, Lakes, Alaska

Heliochona psychra n. sp. (Ciliata: Chonotrichida), an ectocommensal on the pleopodal bristles of Gammarus setosa Dementieva from Nuwuk Lake, a marine halocline lake at Point Barrow, Alaska is described. H. psychra differs from the older species H. scheutenii Stein and H. sessilis Plate in its size, outline of the cytosome, and appearance of the funnel rays. (Author)

AD-630 403 Fld. 6/13
LINDE DIV UNION CARBIDE CORP TONAWANDA N Y
GROWTH RESPONSES OF NEUROSPORA CRASSA TO INCREASED PARTIAL PRESSURES OF THE NOBLE GASES AND NITROGEN,
by R. G. Buchheit, H. R. Schreiner, and G. F. Doebbler. 16 Sep 65, 7p. Contract Nonr-4115 (00),

Unclassified report

Availability: Published in Journal of Bacteriology v91 n2 p622-7 Feb 1966. Copies to DDC users only.

Descriptors: (*Helium group gases, Neurospora), (*Neurospora, Growth), Pressure, Inhibition, Physical properties, Culture media, Anesthesia, Glycolysis, Respiration

Growth rate of the fungus Neurospora crassa depends in part on the nature of metabolically 'inert gas' present in its environment. At high partial pressures, the noble gas elements (helium, neon, argon, krypton, and xenon) inhibit growth in the order: Xe > Kr > Ar >> Ne>> He. Nitrogen (N2) closely resembles He in inhibitory effectiveness. Partial pressures required for 50% inhibition of growth were: Xe (0.8 atm), Kr (1.6 atm), Ar (3.8 atm), Ne (35 atm), and He (approx. 300 atm). With respect to inhibition of growth, the noble gases and N2 differ qualitatively and quantitatively from the order of effectiveness found with other biological effects, i.e., narcosis, inhibition of insect development, depression of O2 -dependent radiation sensitivity, and effects on tissue-slice glycolysis and respiration. Partial pressures giving 50% inhibition of N. crassa growth parallel various physical properties (i.e., solubilities, solubility ratios, etc.) of the noble gases. Linear correlation of 50% inhibition pressures to the polarizability and of the logarithm of pressure to the first and second ionization potentials suggests the involvement of weak intermolecular interactions or charge-transfer in the biological activity of the noble gases. (Author)

AD-630 479 Fld. 6/13, 6/3
SCHOOL OF AEROSPACE MEDICINE BROOKS AFB TEX

'PHAGE TYPE AND ANTIBIOTIC SENSITIVITY OF STAPHYLOCOCCI ISOLATED FROM MONKEYS AND THEIR HUMAN HANDLERS,
by Robert J. Ball, and Jerome P. Schmidt. 15 Feb 65, 6p. Rept. no. SAM-TR-65-316, Task 775302,
Unclassified report

Availability: Published in American Journal of Epidemiology v82 n2 p112-4 1965. Copies to DDC users only.

Descriptors: (*Staphylococcus, Monkeys), Nose, Antibiotics, Sensitivity, Resistance (Biological), Culture media, Classification

Ninety-three of 132 monkeys and 14 of 34 handlers were found to be harboring nasal staphylococci which exhibited coagulase activity. With the International Base Set of 21 'phages, 61 of the monkey isolates and 12 of the human strains gave a positive reaction. Antibiotic sensitivity tests revealed that 40 of the 61 typable isolates from the monkeys were resistant to penicillin while all of the 32 nontypable isolates were sensitive. All but 4 of the 12 typable human isolates were sensitive to penicillin. None of the staphylococci recovered from the monkeys were of 'phage types usually regarded as highly invasive for human beings. (Author)

AD-630 514 Fld. 6/13
COLUMBIA UNIV NEW YORK COLL OF PHYSICIANS AND SURGEONS
ELECTRON MICROSCOPY OF MAGNESIUM-DEPLETED BACTERIA,
by Councilman Morgan, Herbert S. Rosenkranz, Betty Chan, and Harry M. Rose. 8 Nov 65, 6p. Contract Nonr-266 (89), Proj. NR-103-574,
Unclassified report

Availability: Published in Journal of Bacteriology v91 n2 p891-5 Feb 1966. Copies to DDC users only.

Descriptors: (*Electron microscopy, Escherichia coli), (*Ribosomes, Electron microscopy), Bacteria, Magnesium, Culture media, Ribonucleic acids, Synthesis, Viability, Growth

An electron microscope was used to examine bacteria after depletion of ribosomes. Advantage was taken of the fact that incubation of Escherichia coli in media devoid of magnesium causes loss of ribosomes without concurrent loss of viability (McCarthy, Biochim. Biophys. Acta 55:880, 1962); addition of Mg (++) results in logarithmic growth after a 5- to 6-hour delay. During this delay, a 'nascent ribosomal ribonucleic acid (RNA)' accumulates (Suzuki and Hayashi, Biochim. Biophys. Acta 87:610, 1964), and this is followed by the production of 30S and 50S ribosomal subunits. (Author)

AD-629 755 **See Fld. 6/1**

AD-629 911 **See Fld. 6/5**

AD-629 995 **See Fld. 6/16**

6/14. PERSONNEL SELECTION AND MAINTENANCE (MEDICAL)

AD-630 466 **See Fld. 6/7**

AD-630 477 **See Fld. 5/9**

6/15. PHARMACOLOGY

AD-629 961 Fld. 6/15, 6/5
ARMED FORCES INST OF PATHOLOGY WASHINGTON D C
EFFECTS OF THE METABOLITES OF PHENACETIN ON THE RAT.
by Bertram Schnitzer, and Edward B. Smith. 27 Dec 65, 4p.
Unclassified report

Prepared in cooperation with Michigan Univ., Ann Arbor, Dept. of Pathology. Sponsored by DASA.

Availability: Published in Arch. Path. v81 p264-7 Mar 1966. Copies to DDC users only.

Descriptors: (*Analgesics + antipyretics, Pathology), (*Kidneys, Analgesics + antipyretics), Acetic acids, Phenols, Amino acids, Metabolism, Toxicity, Hemolysis, Erythrocytes, Spleen, Hemoglobin, Hematology, Histology, Rats

For a period of 13 weeks young male Osborne-Mendel rats were fed diets containing N-acetyl-p-aminophenol (NAPA), the major metabolite of phenacetin; p-phenetidin, the minor metabolite of phenacetin; acetic-4-chloranilide (A4CA), the contaminant present in phenacetin; and phenacetin. The results indicate that the administration of p-phenetidin causes changes identical to those associated with the feeding of A4CA. These results include a compensated hemolytic process with Heinz bodies in erythrocytes, enlargement of the spleen with an increase of hemosiderin deposits, and hemosiderin and hemosiderin-negative pigment in renal tubular epithelium and in Kupffer cells. Rats fed phenacetin in a concentration of 1.5% of the diet showed Heinz bodies in red blood cells. Whether formation of Heinz bodies in these animals is due to phenacetin itself, or to the presence of A4CA in phenacetin, or to the production of p-phenetidin in vivo, or to a combination of these factors remains to be determined. No changes were observed in rats fed NAPA or in the control animals. (Author)

AD-630 199 Fld. 6/15, 7/3
CFSTI Prices: HC $2.00 MF $0.50
VANDERBILT UNIV NASHVILLE TENN
GLYCIDIC ESTERS AND/OR ORGANIC DISULFIDES AND RELATED SUBSTANCES, AS SOURCES OF ANTIRADIATION DRUGS.
Interim research rept. no. 25, 1 Oct-31 Dec 65, by J. D. Buckman, R. B. Barbee, M. Bellas, P. R. Engelhardt, and P. M. Giles. 31 Dec 65, 28p. Contract DA-49-193-MD-2030,
Unclassified report

See also AD-600 464.

Descriptors: (*Radioprotective agents, Synthesis (Chemistry)), (*Organic sulfur compounds, Radioprotective agents), Thiols, Sulfides, Ketones, Amines, Sulfonates, Benzoates, O-heterocyclic compounds

Research continued on cyclic disulfides and their oxidation products and on uses of the latter for synthesis of antiradiation drugs. Syntheses were continued of compounds of the type n-C10H21 NH (CH2)2 SS (CH2)n X.HCl. Investigation has begun of compounds of the structure RR'C (OH) S (CH2)2 NH3 (+)Cl (-). A number of studies were made of the compound p-C7H7SO2N = C (SK)2. Reaction of thiolsulfonates with dithio acids proved unpromising for synthesis of structures of the form RC (S)SSR'. Disproportionation studies of a number of carbonyl and thiocarbamoyl disulfides were completed and correlations were drawn with structural features. Research was initiated on the use of sulfonyl sulfides (RSO2-Sx-SO2R) for preparing antiradiation drugs. Synthetic work directed toward preparation of 2,5bis- (2-aminoethyldithio)-1,4-benzenedicarboxylic acid, a bis analog of the active drug o-(2-aminoethyldithio)benzoic acid (VU26), was continued.

6/16. PHYSIOLOGY

AD-629 995 Fld. 6/16, 6/13
STANFORD UNIV CALIF DEPT OF PHYSIOLOGY
MODE OF ACTION OF TETANUS TOXIN ON THE NEUROMUSCULAR JUNCTION,
by Rodney L. Parsons, W. W. Hofmann, and George A. Feigen. 1 Jul 65, 8p. Contract Nonr-225 (46) ,PHS-HE-03693-06
Unclassified report

Prepared in cooperation with Veterans Administration Hospital, Palo Alto, Calif. Dept. of Neurology.

Availability: Published in American Journal of Physiology v210 n1 p84-90 Jan 1966. Copies to DDC users only.

Descriptors: (*Clostridium tetani, Toxins + antitoxins), (*Toxins + antitoxins, Neuromuscular transmission), Electrophysiology, Nerves, Muscles, Polarization, Electrolytes (Physiology), Calcium, Potassium, Magnesium, Voltage

Studies on the source of the activated spontaneous discharge of miniature end-plate potentials (MEPP's) by tetanus toxin indicate that the MEPP's are those whose release mechanism is both calcium- and voltage-dependent. The potentiation of spontaneous release by toxin did not occur in the absence of calcium or magnesium; it was enhanced by increasing the calcium concentration. These results, together with the observation that depolarization by potassium blocked or reversed the peripheral effect of tetanus toxin, suggest that the toxin acts by lowering the presynaptic resting membrane potential. Studies of the direct effect of toxin on neuromuscular transmission in the rat phrenic nerve-diaphragm preparation indicate that the toxin decreases the probability of transmitter release by a nerve spke, the rate of initial transmitter depletion, and the level of sustained transmitter output. (Author)

AD-630 025 Fld. 6/16, 9/4
CFSTI Prices: HC $7.60 MF $0.75
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
MAN'S SENSES AS INFORMATIONAL CHANNELS,
by G. H. Mowbray, and J. W. Gebhard. May 58, 71p. Rept. no. cm-936, Contract NOrd-7386,
Unclassified report

Descriptors: (*Sensory perception, Information theory), (*Information theory, Sensory perception), Sensory mechanisms, Ear, Eye, Skin, Vision, Hearing, Thresholds (Physiology), Visual perception, Auditory perception

The sum and substance of man's experience is mediated by his senses. Too often the fact is ignored that other senses besides those of vision and hearing provide important ancillary sources of information. There is a strong tendency, especially in many military and industrial applications, to overload one of the senses whether through expediency or the general compounding of complexity. This review attempts to survey in a general fashion what is known about man's ability to make use of his sensory capacities for the gathering of information. Where possible, comparisons between different sense modalities are made and the problem of sensory interactions is discussed. Some suggestions are offered relative to the possible unburdening of men in complex environments by the judicious use of some of the subordinate sensory channels. (Author) (Expanded version of TG-264, issued in March 1956 as 'Comparison and interaction among sensory input channels,' which formed chapter 4 of the 'Joint services human engineering guide to equipment design').

AD-630 051 Fld. 6/16
CFSTI Prices: HC $5.60 MF $0.75
KAROLINSKA INSTITUTET STOCKHOLM (SWEDEN) DEPT OF PHYSIOLOGY
ELECTRICAL ACTIVITY AND CELL DENSITY IN THE CLAUSTRO-INSULAR AREA OF THE RABBIT,

by Pentti Valleala. 1961, 60p. Contract AF 61 (052)-21, AFOSR 2132

Unclassified report

Pub. in Acta Physiologica Scandinavica v52 suppl 182 p5-61 1961.

Descriptors: (*Cerebral cortex, Electroencephalography), (*Electroencephalography, Cytology), (*Cells (Biology), Density), Distribution, Rabbits, Sweden, Brain

The purpose of the investigation was to study the relation between the cell density and the spontaneous spike and slow wave activity in different cortical layers.

AD-630 053 Fld. 6/16
PENNSYLVANIA UNIV PHILADELPHIA DEPT OF PHYSIOLOGY
ROLE OF THE NERVOUS, ENDOCRINE AND RENAL SYSTEMS IN CARDIOVASCULAR REGULATION,
by L. H. Peterson, G. Karreman, J. G. Llaurado, G. Webster, and F. Attinger. 1966, 1p. Contract Nonr-551 (18) ,PHS-HE-07762

Unclassified report

Availability: Published in Abstracts of Papers presented at International Congress of Physiological Sciences (23rd). Copies to DDC users only.

Descriptors: (*Cardiovascular system, Control), (*Kidneys, Cardiovascular system), (*Nervous system, Cardiovascular system), (*Endocrine glands, Cardiovascular system), Abstract, Physiology

The development of means of studying complex, multifunction systems is a major challenge to physiology. Thus, cardiovascular system behavior is determined by nervous, endocrine, renal, etc., functions. These interactions constitute an even larger physiological system. Our scientific program consists of (i) assembling current concepts of appropriate biological interactions as a computer programmed model; (ii) testing the validity of these concepts by comparing model and living system behavior and; (iii) progressively improving the model by obtaining and programming new information and revised concepts. This approach will be illustrated by presenting the current model and indicating its known defects. Studies relating endocrine aspects of vessel water and electrolyte content and smooth muscle activity and their effects on vascular tone and the role of these factors on cardiovascular neuro -receptor activity will also be discussed. (Report quoted in its entirety)

AD-630 153 Fld. 6/16
CALIFORNIA UNIV BERKELEY NEUROSENSORY LAB
SPATIAL INTERACTION IN THE HUMAN RETINA DURING SCOTOPIC VISION,
by G. Westheimer. 14 Jun 65, 14p. Contract PHS-NB-3154,

Unclassified report

Supported in part by ONR.

Availability: Published in J. Physiol. v181 p881-94 1965. Copies to DDC users only.

Descriptors: (*Retina, Adaptation (Physiology)), (*Vision, Sensitivity), Background, Brightness, Thresholds (Physiology), Light

The influence of various sizes and brightness of background on the sensitivity of scotopic vision was assessed by observing their effects on increment threshold for a small brief extrafoveal test flash. Light falling on or near the retinal area tested elevates the increment threshold. Additional light falling outside a zone about 3/4 degree in diameter centred on the test flash lowers the increment threshold, but this lowering cannot be demonstrated until the threshold has been raised to a certain level by illumination of the central zone. The observations were confirmed by an experiment in which the size and retinal illuminance of the background were varied so as to keep the increment threshold constant. (Author)

AD-630 179 Fld. 6/16
STANFORD RESEARCH INST MENLO PARK CALIF
IMPEDANCE AS A MEASURE OF FLOW VELOCITY IN SALT SOLUTIONS,
by Lucy Birzis. 8 Mar 65, 5p. Contract Nonr-2993 (00) ,NIH-NB-04210

Unclassified report

Availability: Published in Journal of Applied Psysiology v21 n1 p329-33 Jan 1966. Copies to DDC users only.

Descriptors: (*Blood circulation, Measurement), (*Brain, Blood circulation), Electrical impedance, Solutions, Electrolytes (Physiology), Fluid flow, Velocity, Salts

A method of impedance plethysmography used for the detection of local cerebral blood flow changes has also been found to be valid in blood-free salt solutions. From quantitative experiments on steady-state flow under gravity and on pulsatile flow in a circulatory model, it was concluded that the impedance change is proportional to the linear flow velocity of the ionic solution. Factors such as temperature, salinity, and others, which reduce the basal interelectrode impedance, tend to increase the sensitivity of the impedance change with flow. The sign of the impedance change reverses with reversal of direction of flow. The impedance change was shown to be independent of pressure change under no-flow conditions. Some possible mechanisms are discussed, as well as factors involved in applying the method to tissue studies. (Author)

AD-630 186 Fld. 6/16
KAROLINSKA INSTITUTET STOCKHOLM (SWEDEN) DEPT OF PHYSIOLOGY
FURTHER STUDIES ON PIGMENT MIGRATION AND SENSITIVITY CHANGES IN THE COMPOUND EYE OF NOCTURNAL INSECTS,
by C. G. Bernhard, and D. Ottoson. 1961, 2p. Contract AF 61 (052)-21, AFOSR 2130

Unclassified report

Availability: Published in Acta Physiol. Scand. v52 p99-100 1961. Copies to DDC users only.

Descriptors: (*Vision, Adaptation (Physiology)), (*Eye, Organic pigments), (*Organic pigments, Photosensitivity biological), Lepidoptera, Thresholds (Physiology), Sweden, Arthropods

AD-630 303 Fld. 6/16
CFSTI Prices: HC $1.60 MF $0.50
GEOSCIENCE LTD LA JOLLA CALIF
THERMAL AND ELECTRICAL CONDUCTIVITIES OF BIOLOGICAL FLUIDS AND TISSUES.
Quarterly rept. for 1 Oct-31 Dec 65,
by H. F. Poppendiek, N. D. Greene, and P. M. Morehouse. 31 Dec 65, 16p. Rept. no. GLR-44, Contract Nonr-4095 (00),

Unclassified report

See also AD-620 916.

Descriptors: (*Body fluids, Electrical conductance), (*Tissues (Biology), Thermal conductivity), (*Liver, Freezing), Kidneys, Brain, Bovines, Muscles, Cryogenics, Blood, Blood plasma, Hemoglobin

Experimental changes in the electrical conductivity of bovine liver were determined after both slow and rapid freeze-thaw exposures. The ratio of conductivities for exposed to unexposed specimen varied from 1.2 to 2.0 after freezing to a little below 32F and slowly thawing to room temperature. The ratio of conductivities for exposed to unexposed samples was 1.04 after freezing to -320F and rapidly thawing in warm water. In the current research program, thermal and electrical conductivities both increased after freeze-thaw stressing. Cryogenic freezing and rapid thawing cause minimum changes in the conductivities for the materials studied (liver, kidney, brain, and muscle). On the basis of the present thermal and electrical conductivity research, it is felt that changes in these properties can be used as indices for biochemical and morphological changes in exposed biological specimens. (Author)

AD-630 316 Fld. 6/16, 20/6
CFSTI Prices: HC $5.00 MF $1.00
RAND CORP SANTA MONICA CALIF
A CRITICAL REVIEW OF THE EXPERIMENTAL FOUNDATION OF HUMAN COLOR PERCEPTION,
by Joseph J. Sheppard,Jr.. Jan 66, 187p. Rept. no. RM-4196-ARPA,
Contract SD-79, ARPA Order-189-61

Unclassified report

Descriptors: (*Color vision, Psychophysiology), Colorimetry, Optics, Experimental data, Photoreceptors, Anatomy, Histology, Morphology (Biology), Electrophysiology, Biophysics, Nervous system, Physiology, Retina, Nerve cells, Cerebral cortex, Mathematical models, Visual perception

A presentation of the minimum material needed for a comprehensive study of normal human color perception. The artificial nature of colorimetry is discussed, with emphasis on the distinction between experimental facts established in the matching experiments and the formalism of colorimetry derived in part from these facts. A representative portion of the available experimental data on individual foveal spectral sensitivity is collected and analyzed. Data on the initial photoreception process and the anatomy, histology, morphology, ontogeny, and electrophysiology of the retinal neurons are analyzed, noting the multiplicity of results indicating a fundamental difference between receptor mechanisms in the rods and cones. A review of data on central neural mechanisms indicates a complex, dynamic role for the lateral geniculate nuclei in human color vision. Considerations of diverse psychophysiological phenomena are summarized. The general conclusion of the study is that the available experimental evidence does not clearly dictate the fundamental physiological processes mediating human color vision. Principal conclusions are discussed in relation to the three distinct fields of colorimetry, visual biophysics, and visual psychophysics. Four suggestions are given for psychophysical modeling. (Author)

AD-630 386 Fld. 6/16, 6/1
ARMY RESEARCH INST OF ENVIRONMENTAL MEDICINE NATICK MASS
STUDIES ON THE IN SITU METABOLISM OF THE CANINE THYROID GLAND,
by R. S. Goldsmith, S. H. Ingbar, D. E. Bass, and H. Bigbee. 1965, 9p.

Unclassified report

Prepared in cooperation with Harvard Medical School, Boston, Mass. Dept. of Medicine.

Availability: Published in Current Topics in Thyroid Research, Proceedings of the International Thyroid Conference (5th). Copies to DDC users only.

Descriptors: (*Thyroid gland, Metabolism), Thiocyanates, Hormones, Blood circulation, Blood volume, Hematocrit, Glucose, Phosphates, Fatty acids, Dogs

A technique was developed for assessing substrate utilization by intact canine thyroid glands in situ and for determining the effect thereon, both acutely and chronically, of various agents that affect thyroid physiology. The paper describes the tech-

nique of study and some of the preliminary results that have been obtained with regard to both the 'resting' metabolism of the gland and the acute effects of TSH and thiocyanate injection.

AD-630 462 Fld. 6/16
CFSTI Prices: HC $2.00 MF $0.50
JOHN B PIERCE FOUNDATION OF CONNECTICUT NEW HAVEN
NEURONES AND TEMPERATURE REGULATION.
Final rept. Mar 63-Mar 65,
by H. T. Hammel. Dec 65, 39p. Contract AF 33 (657)-11103, Proj. AF-7164, Task 716409, AMRL TR-65-232

Unclassified report

Descriptors: (*Body temperature, Control), (*Nerve cells, Body temperature), Thalamus, Dogs, Sleep, Exercise, Fevers

An attempt was made to ascribe the regulation of body temperature in homeotherms to the hypothalamus and the preoptic region. Results of measurements of hypothalamic temperature and regulatory responses in the normal dog in hot, neutral and cold environments and, at various times, in the resting, waking, sleeping, exercising and fevered state, are interpreted on the assumption that the hypothalamus responds to changes in its own temperature like a proportional controller with an adjustable set point. For each thermal regulatory response, the response was as if its magnitude were proportional to the deviation of the actual hypothalamic temperature from a set point temperature, and as if the set point temperature were to increase in the cold environment, decrease in the hot environment, decrease at the onset of sleep, decrease at the onset of exercise and increase in fever. A model based on known characteristics of neurones is proposed which appears to function like a proportional controller with an adjustable set point. (Author)

AD-629 865 **See Fld. 6/18**

AD-630 133 **See Fld. 6/3**

AD-630 388 **See Fld. 6/1**

6/18. RADIOBIOLOGY

AD-629 865 Fld. 6/18, 6/16, 6/5
CFSTI Prices: HC $1.00 MF $0.50
DEPARTMENT OF THE NAVY WASHINGTON D C
THE EFFECT OF MICROWAVES ON THE FUNCTIONAL STATE OF NERVE,
by Yu. I. Kamenskii. 1966, 13p. Rept. no. Translation-2121,
TT 66-60757

Unclassified report

Deistvie Mikrovoln na Funktsionalnoe Sostoianie Nerva, trans. of Biofizika (USSR) v9 n6 p695-700 1964.

Descriptors: (*Radiobiology, Microwaves), (*Nerves, Microwaves), (*Microwaves, Nervous system), Amphibians, Physiology, USSR, Thresholds (Physiology), Thermal properties

The results are described of studies of the functional state of frog nerve (n. ischiadicus): of the stimulus thresholds, of the velocities of stimulus conduction, of the absolute and relative refractory phases, of the amplitude of the action potentials--upon irradiation by microwaves of non-thermal intensity during continuous and pulsed regimes.

AD-629 962 Fld. 6/18, 6/5
ARMED FORCES INST OF PATHOLOGY WASHINGTON D C
TPM-2: EFFECTS OF LASER IRRADIATION ON THE SKIN,
by J. G. Kuhns, E. B. Helwig, M. Stein, and J. R. Hayes. 1965, 2p.

Unclassified report

Also includes Biological Effects of Laser Radiation II.

Availability: Published in Nerem Record, A digest of papers presented at the Northeast Electronics Research and Engineering Meeting on November 3, 4 and 5, 1965. Copies to DDC users only.

Descriptors: (*Lasers, Radiation injuries), (*Radiobiology, Lasers), Pathology, Skin, Burns, Ruby, Dosage, Organic pigments, Enzymes, Temperature, Tissues (Biology), Biopsy, Histology, Swine

Experiments were continued to evaluate the effects of non Q-switched ruby laser irradiation on skin. Investigations were directed toward establishing minimal doses of laser irradiation that produced injury, evaluating the effect of the irradiation on pigmented versus non-pigmented skin, correlating the structural and enzymatic changes with predicted temperatures occuring in the skin after a given dose, and understanding the lesions in terms of the physical characteristics of the beam.

AD-630 103 Fld. 6/18
CFSTI Prices: HC $2.60 MF $0.50
NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF
EFFECTS OF TOTAL-BODY X IRRADIATION ON PERITONEAL AND CIRCULATING LEUCOCYTES OF MICE,
by Lottie Kornfeld, and Vivian Greenman. 13 Jan 66, 26p. Rept. no. USNRDL-TR-966, NAVMED MR005.08-1200-4

Unclassified report

Descriptors: (*Leukocytes, Radiation effects), (*X rays, Whole body irradiation), Peritoneum, Mice, Blood circulation, Cells (Biology), Phagocytes

Total-body X irradiation over a wide range of doses was found to alter the number and distribution of cells in the perjtoneal cavity of unstimulated LAF-1 mice. Unirradiated controls yielded 5-7 x 10 to the 6th power mononuclear cells, about 30% of which were macrophages and 70% small and medium lymphocytes. Following exposure to sublethal X ray doses (90-590 R), macrophage counts were essentially unaltered for two weeks but declined slightly during the 3rd week after 390-590 R. Following a midlethal dose (690 R), the number of macrophages was unchanged for one week but fell to about 50% of the normal value by 21 days postirradiation. After lethal irradiation (790-1190 R), macrophage counts remained unaltered for 3 days but decreased on the 7th day. The number of lymphocytes in the peritoneal cavity decreased sharply within 24 hours after every dose employed and then declined further at a more gradual rate. Both the initial and the subsequent disappearance of lymphocytes increased in severity with increasing exposure. During the first week postirradiation, a linear relation existed between the percentage of lymphocytes in the peritoneal cell population and the X ray dose. (Author)

AD-630 185 Fld. 6/18
KAROLINSKA INSTITUTET STOCKHOLM (SWEDEN)
DETERMINATION OF 90SR AND STABLE STRONTIUM IN BONES FROM SHEEP EWES AND THEIR FETUSES,
by S. Haggroth, and G. Hoglund. 18 Nov 60, 9p. Contract AF 61 (052)-15 ,AF 61 (052)-21 AFOSR 2131

Unclassified report

Availability: Published in Experimental Cell Research v24 p80-7 1961. Copies to DDC users only.

Descriptors: (*Strontium, Bone), (*Bone, Strontium), Radiological contamination, Mammals, Embryos, Sweden, Radioactive isotopes, Stable isotopes, Concentration (Chemistry), Calcium

The concentrations of Sr90 and stable strontium were measured in the bone ash from pregnant sheep ewes and their fetuses. The fetuses weighed from 125 g (Sr90) and 110 g (stable strontium) to 2650 g. In the ewes the average concentration of Sr90 was 40.4 (s.d. 6.4) pc/g calcium in the metatarsal diaphyses and 38.4 (s.d. 3.9) pc/g calcium in the vertebrae. The average concentration of stable strontium was 321 (s.d. 37) p.p.m. in the metatarsal diaphyses and 324 (s.d. 26) p.p.m. in the vertebrae. No significant difference between the two bones in the concentrations of either Sr90 or stable strontium was found. In the fetuses the average concentrations of Sr90 and stable strontium in the ash from the ossified parts of the long bone diaphyses was 16.2 (s.d. 2.5) pc/g calcium and 152 (s.d. 27) p.p.m. respectively. The average ratio between the strontium concentrations in the long bones of each fetus and the metatarsal bones of its mother was 0.41 (s.d. 0.06) for Sr90 and 0.48 (s.d. 0.08) for stable strontium. The strontium concentrations in the fetal and maternal bone ash, and the ratio between these concentrations, were essentially independent of fetal weight and sacrifice date. (Author)

AD-630 323 Fld. 6/18
CFSTI Prices: HC $1.60 MF $0.50
NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF
RESPONSES OF SINGLE NEURONS IN THE OLFACTORY BULBS OF RABBITS, DOGS, AND CATS TO X RAYS,
by Gary P. Cooper, and Donald J. Kimeldorf. 26 Jan 66, 15p. Rept. no. USNRDL-TR-969, NAVMED MR005.08-1

Unclassified report

Descriptors: (*Nerve cells, Radiation effects), (*Radiation effects, Nerve cells), Nose, X rays, Sense organs, Radiological dosage, Nerve impulses, Rabbits, Dogs, Cats

Extracellular microelectrode recordings were made of the activity of single neurons in the olfactory bulbs of anesthetized cats, rabbits, and dogs. In all three species, brief exposure to x-rays (250 KVP; exposure rate, 1 R per second) produced an alteration in firing rate in some olfactory bulb neurons. The response to irradiation was usually an increase in firing rate, but in a few cases a depression in firing rate was observed. (Author)

AD-630 332 Fld. 6/18
CFSTI Prices: HC $2.00 MF $0.50
NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF
COMPARISON OF DOSE PATTERNS IN A DOG EXPOSED TO NEUTRONS AND TO X RAYS,
by Catharine L. Wingate, Norbert P. Page, and E. John Ainsworth. 7 Feb 66, 28p. Rept. no. USNRDL-TR-974, NAVMED MR005.08-5201-1

Unclassified report

Descriptors: (*Radiological dosage, Dosimeters), Neutrons, Gamma rays, X rays, Radiobiology, Tissues (Biology), Bone, Nuclear reactors, Whole body irradiation, Penetration, Health physics, Dose rate, Dogs

Dose distributions with depth in a dog cadaver and in a cylindrical phantom have been obtained for 1 Mvp transmitted X rays and for mixed neutron and gamma radiation from a reactor. The ratio of neutron to gamma dose was 4:1 at the surface of the dog. Measurement of the gamma or X-ray dose was made using LiF thermoluminescence dosimeters, while neutron dose was obtained from the activation of small sulfur pellets, with suitable calibrations. Placement of dosimeters was verified by roentgenography. Penetration of the 1 Mvp X rays is considerably higher than that of the reactor neutrons, whose effective energy is about 1 Mev, and does not appear to differ significantly in various cross sections of the body as was found for 250 Kvp X rays by others. For the reactor beam ad-

ministered unilaterally the energy deposition in the dog is strongly asymmetric as shown by isodose configurations for the neutron and gamma components. However, only minor variations were found in the depth dose curves for the phantom and different sections through the dog cadaver, namely, head, chest and abdomen, in spite of the differences in composition and density. (Author)

AD-630 338 Fld. 6/18
CFSTI Prices: HC $4.60 MF $0.50
NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF
ENDOTOXIN-PROTECTION OF MICE. THE RELATIONSHIP TO COLONY-FORMING UNITS,
by Gerald E. Hanks, and E. John Ainsworth. 21 Dec 65, 44p. Rept. no. USNRDL-TR-957, NAVMED MR005.08-5201-1
Unclassified report

Descriptors: (*Toxins + antitoxins, Radioprotective agents), (*Radiobiology, Hemopoietic system), (*Hemopoietic system, Stimulation), Bone marrow, Spleen, Hematology, Cell division, Sensitivity, Whole body irradiation, Survival, Mice, Tables

Earlier studies have shown that bacterial endotoxins increase survival of irradiated animals. Although these substances do not confer as much protection as do the classical chemical protectants, endotoxins do significantly increase survival when given either before or for a short time following irradiation. The mechanisms of endotoxin protection have not been clearly established, but earlier studies have shown that hematopoietic stimulation is involved. The present studies were designed to evaluate the effects of endotoxin on proliferative cells in the hematopoietic system. Methods have recently been devised to measure the numbers of certain proliferative cells within the bone marrow, spleen, and other hematopoietic sites. These proliferative cells are called colony-forming units (CFU's), and their numbers are estimated by counting the 'colonies' or nodules in the spleens of irradiated mice which arise either 'spontaneously' or after injection of hematopoietic cells. The present data indicate that endotoxin does not alter the radiosensitivity of endogenous splenic CFU's; the D37 for CFU's is approx. 90 R in both endotoxin-treated and control mice. When endotoxin is injected at the time which produces optimal survival, the femur content of CFU's increases approx. 2 fold; whereas, the spleen content of CFU's is increased approx. 20 fold. The increased rate of CFU's migration from the femur to the spleen in endotoxin-treated animals may contribute to the relatively greater increase in splenic CFU's. (Author)

AD-630 390 Fld. 6/18
CFSTI Prices: HC $2.60 MF $0.50
NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF
THE EFFECT IN STOMACH OF IONIZING RADIATION ON ACID SECRETION, POTENTIAL, ADENOSINE TRIPHOSPHATE AND PHOSPHOCREATINE IN COMPARISON TO SPLEEN,
by Joseph T. Cummins, Herbert H. Kohl, and Burton E. Vaughan. 21 Feb 66, 24p. Rept. no. USNRDL-TR-980, NAVMED MR005.08-1200-1
Unclassified report

Descriptors: (*Radiation effects, *Stomach), (*Spleen, Radiation effects), Acids, Secretion, Adenosine phosphates, Organic phosphorus compounds, In vitro analysis, Stimulation, Phosphorylation, Metabolism, Electrolytes (Physiology), Gastrointestinal system, Radiobiology, Electrophysiology

Results using an In Vitro rat stomach preparation indicate that gastric acid secretion is stimulated through neurological pathways and induced by both handling and irradiation. The changes in acid secretion occurred independently of alterations in the sodium-potassium dependent potential across the stomach. Despite the two functional radiation effects, there were no gross changes in phosphorylative metabolism in rat stomach, otherwise adenosinetriphosphate and phosphocreatine would have been affected. At the same time, there was the expected irradiation change in spleen ATP, but the spleen phosphocreatine remained unchanged. The latter is a new observation which puts in question some aspects of the current cellular theory of splenic irradiation effects. (Author)

AD-630 281 **See Fld. 15/3**

6/19. STRESS PHYSIOLOGY

AD-630 012 Fld. 6/19
CFSTI Prices: HC $4.60 MF $0.50
BOSTROM RESEARCH LABS MILWAUKEE WIS
THE EFFECT OF LOW FREQUENCY, HIGH AMPLITUDE, WHOLE BODY, LONGITUDINAL AND TRANSVERSE VIBRATION UPON HUMAN PERFORMANCE.
Final rept.,
by Richard J. Hornick, Charles A. Boettcher, and Allison K. Simons. Jul 61, 50p. Contract DA-11-022-509-ORD-3300, Proj. TEI-1000,
Unclassified report

Descriptors: (*Performance (Human), Vibration), (*Vibration, Performance (Human)), Stress (Physiology), Vehicles, Low frequency, Adaptation (Physiology), Respiratory system, Visual acuity

Two experiments were conducted to determine the effects of horizontal (transverse and longitudinal) vibration upon the seated human being. Such vibration is typically found in ground vehicles. The transverse (side-to-side) vibration experiment utilized frequencies from 1.5 to 5.5 cps, with intensities of 0.15, 0.25, and 0.35 g. Measures were taken before, during, and following vibration exposure. The longitudinal (fore-aft) vibration experiment utilized the same frequencies with intensities of 0.15, 0.25, and 0.30 g. Measures taken during both experiments were of: compensatory tracking ability, choice reaction time, foot pressure constancy, peripheral vision, visual acuity, body equilibrium, bodily transmissibility, oxygen consumption, breathing rate and total ventilation. The results indicate that transverse and longitudinal, whole-body vibration does affect tracking ability, choice reaction time, foot pressure constancy, and peripheral vision, with some performance decrements being related to specific frequencies and to intensity increments. Visual acuity and body equilibrium were not affected. Performance decrements, transmissibility, and respiratory effects are related and discussed. (Author)

AD-630 114 Fld. 6/19
CFSTI Prices: HC $1.00 MF $0.50
AEROSPACE MEDICAL RESEARCH LABS WRIGHT-PATTERSON AFB OHIO
PHYSIOLOGICAL STATUS OF MEN SUBJECTED TO PROLONGED CONFINEMENT.
Final rept. Feb 63-Feb 65,
by E. W. Speckmann, K. J. Smith, K. M. Offner, and J. L. Day. Dec 65, 19p. Rept. no. AMRL-TR-65-141,
Proj. AF-7164, Task 716405,
Unclassified report

Prepared in cooperation with National Aeronautics and Space Administration, Houston, Tex. Manned Spacecraft Center, NASA Order R-85.

Descriptors: (*Confined environments, Stress (Physiology)), (*Stress (Physiology), Confined environments), Cardiovascular system, Metabolism, Space simulation chambers, Humans, Electrocardiography, Electroencephalography, Blood pressure, Respiration, Body temperature, Space medicine, Carbon dioxide, Oxygen consumption, Relaxation (Physiology), Exercise, Pulse rate, Tolerances (Physiology), Adjustment (Physiology)

To determine if confinement of men resulted in physiological changes, 12 men in groups of 4 each were confined for 28 consecutive days. During this time, daily measurements of ECG, EEG, blood pressure, respiration, and oral temperature were made. Oxygen consumption and carbon dioxide production were measured daily on four subjects for 6 days before and for 6 days following confinement as well as three times weekly during confinement. With eight subjects, the same measurements were made before, during, and following exercise on a bicycle ergometer at a rate causing the subject to expend an average of 70 additional kcal per hour above resting values. The same metabolic measurements were made on four subjects 2.5 hours postprandial. The metabolic responses to confinement as well as exercise during confinement were measured. In general, there were no significant measured physiological changes from pretest control values resulting from prolonged confinement. (Author)

AD-630 476 Fld. 6/19
SCHOOL OF AEROSPACE MEDICINE BROOKS AFB TEX
METHOD FOR DETERMINATION OF CALCIUM IN SERUM, PAROTID FLUID AND URINE IN THE WEIGHTLESS STATE.
Rept. for Jul 64-Mar 65,
by Bruce A. Butcher, Joseph E. Eastis, and Dale A. Clark. 27 Mar 65, 8p. Rept. no. SAM-TR-65-222,
Task 775301,
Unclassified report

Availability: Published in Aerospace Medicine v36 n11 p1032-5 Nov 1965. Copies to DDC users only.

Descriptors: (*Space medicine, Calcium), (*Calcium, Quantiative analysis), Weightlessness, Blood serum, Saliva, Urine, Body fluids, Blood chemistry, Magnesium, Proteins, Metabolism, Hemolysis

Since the Manned Orbiting Laboratory program includes on-board monitoring of calcium metabolism, a method suitable for this determination under conditions of weightlessness has been investigated. Most techniques for calcium assay that are used at the present time have certain disadvantages that would preclude their use under conditions of weightlessness; whereas the nuclear fast red dye (NFR) technique of Baar, as modified by Kingsley and Robnett, is simple, and all steps in the procedure are compatible with performance in the weightless state. The possible interference of magnesium, hemolysis, and protein was investigated. These effects should be minimal unless drastic changes in magnesium and/or protein level should occur. The interference by hemolysis may be obviated by the use of a proper blank. The method has been adapted to an apparatus to effect mixing in the weightless state and is regarded as a practicable firstgeneration method for monitoring calcium metabolism. (Author)

6/20. TOXICOLOGY

AD-629 764 Fld. 6/20
CFSTI Prices: HC $1.00 MF $0.50
INDUSTRIAL BIOLOGY RESEARCH AND TESTING LABS INC PHILADELPHIA PA
CUTANEOUS TOXICITY EVALUATION OF AIR FORCE DEVELOPMENT MATERIALS - VIII,
Final rept. Jun - Oct 65,
by Morris V. Shelanski. Dec 65, 12p. Contract AF 33 (615)-1571, Proj. AF-6302, Task 630201, AMRL TR-65-208
Unclassified report

Descriptors: (*Toxicity, Chemical compounds), Skin, Tests, Sensitivity, Antigen-antibody reactions, Germicides, Sprays, Nitrophenols, Metalorganic compounds, Tin compounds, Succinates, Rabbits, Humans

Four Air Force development materials were studied via the prophetic patch test method on laboratory animals to determine the primary irritant effect, gross sensitization index, and gross percutaneous toxicity of these materials. The patch test studies with rabbits indicated that one of the materials produced severe primary irritant action. Testing on human volunteers was therefore carried out with three of the materials. Results indicated that these materials were safe to use in contact with human skin. (Author)

AD-630 134 Fld. 6/20
CFSTI Prices: HC $1.00 MF $0.50
BRYN MAWR COLL PA DEPT OF BIOLOGY
STUDIES ON MECHANISMS OF TRYPTOPHAN PYRROLASE INHIBITION DURING ENDOTOXIN POISONING.
Rept. for 1 Dec 64-28 Feb 65,
by George N. Eaves, and L. Joe Berry. Jan 66, 24p. Contract AF 41 (609)-1764, Proj. AF-8241, Task 824101,
AAL TR-65-14

Unclassified report

Descriptors: (*Enzyme inhibitors, Poisoning), (*Poisoning, Enzyme inhibitors), (*Toxins + antitoxins, Poisoning), Toxic tolerances, Mice, Corticosteroid agents, Enzymes, Citrates, Inhibition, Blood plasma

The inhibition of tryptophan pyrrolase in vitro by plasma and certain other native substances was investigated in an attempt to elucidate mechanisms responsible for the assumed decrease in activity of this enzyme in vivo during endotoxin poisoning. The inhibitor in plasma was present in normal mice, but increased significantly in endotoxin-poisoned, cortisone-protected, tolerant and challenged tolerant mice. On the basis of its physical properties and kinetics of inhibition, the plasma inhibitor was identified circumstantially as a globin. Results of kinetic studies eliminated the plasma inhibitor as a causal factor in the irreversible decrease in activity of tryptophan pyrrolase in whole homogenates of liver from endotoxin-poisoned mice. The enzyme was also found to be inhibited by citrate, the concentration of which increases substantially in the liver during endotoxicosis. Since inhibition by citrate could not be reversed by excess cofactor or substrate, it was concluded that at least part of the decreased activity of tryptophan pyrrolase in whole homogenates of poisoned mice was the result of inhibition by citrate. (Author)

Field 7-CHEMISTRY

7/1. CHEMICAL ENGINEERING

AD-629 772 Fld. 7/1
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
A CATALYST MOUNTING TECHNIQUE FOR CLOSE TEMPERATURE CONTROL,
by W. A. Alexander, and E. L. Tollefson. 27 Jul 65, 4p.
NRC 8800

Unclassified report

Availability: Published in Canadian Journal of Chemical Engineering, v43 p346-8 Dec 1965. Copies to DDC users only.

Descriptors: (*Catalysts, Chemical engineering), (*Temperature, Control), Silver, Ethylenes, Oxidation -reduction reactions, Ethylene oxide, Canada

A novel technique for mounting the Cambron-McKim silver catalyst (U. S. Patent 2,567,857) has been developed which provides a highly conducting metal path between the catalyst and the temperature control medium. Its effectiveness as a means of maintaining control over a highly exothermic reaction has been demonstrated in a small pilot plant for the oxidation of ethylene to ethylene oxide. (Author)

AD-630 044 Fld. 7/1, 7/2, 7/3, 7/4, +
CFSTI Prices: HC $7.60 MF $0.75
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C
CHEMISTRY PROGRAM REVIEW. BENZYNE. FISCAL YEAR 1960.
Summary, 1 Jul 59-30 Jun 60.
17 Apr 61, 73p.

Unclassified report

Descriptors: (*Chemistry, Air force research), Reports, Bibliographies, Research program administration, Spectroscopy, Instrumentation, Materials, Chemical reactions, Theory, Benzenes

CONTENTS: Spectra and structure, New methods, techniques and instrumentation, New materials, Chemical reactivity, Theoretical aspects.

7/2. INORGANIC CHEMISTRY

AD-629 761 Fld. 7/2, 11/9
CFSTI Prices: HC $6.60 MF $0.75
HEIDELBERG UNIV (WEST GERMANY) ANORGANISCH-CHEMISCHES INSTITUT
POLYMERIC SULFUR-, PHOSPHORUS-, CARBON NITROGEN - COMPOUNDS.
Summary rept. Mar 60-Feb 63,
by R. Appel, G. Eisenhauer, H. Gerber, A. Hauss, and W. Heinzelmann. Dec 65, 66p. Contract AF 61 (052)-361, Proj. AF-7342 Task 734201, AFML TR-64-368

Unclassified report

Descriptors: (*Inorganic polymers, Synthesis (Chemistry)), (*Sulfur compounds, Polymers), (*Phosphorus compounds, Polymers), (*Carbon compounds, Polymers), (*Nitrogen compounds, Polymers), Cyanates, Chlorine compounds, Amides, Sulfuric acid, Amines, Alcohols, Urea, Imines, Antimony compounds, Phosphoric acids, West Germany

The following bi-functional compounds were synthesized as starting materials for the synthesis of inorganic polymers with sulphur-nitrogen-carbon bonds: Sulfuryl-diisocyanate, O2S (NCO)2; amidosulfuric acidisocyanate, H2NSO2NCO; chlorosulfuryl-isocyanate, C1SO2NCO; fluorosulfuryl-isocyanate, FSO2NCO; imido-bis-sulfuric acid chloride, HN (SO2C1)2, and imido-bis-sulfuric acid fluoride, HN (SO2F02. The polyaddition of diamines and diols with O2S (NCO)2 results in polymers which are not very stable to temperature and hydrolysis. The polymers found by reaction of H2NSO2NCO with urea and sulfamide, O2S (NH2)2, likewise, are not very stable. In the field of the phosphorus-nitrogen-compounds the synthesis of triphenylphosphine-imines and of N-halogen-phosphine imines is described. Further experiments deal with antimony-nitrogen compounds and their reactions. (Author)

AD-630 006 Fld. 7/2, 7/3
CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY
GROUP III ALKYL ADDUCTS OF TRANSITION METAL CYCLOPENTADIENIDES,
by H. Brunner, P. C. Wailes, and H. D. Kaesz. 1965, 6p. Contract DA-ARO (D)-31-124-G413. AROD 3953:2

Unclassified report

Availability: Published in Inorganic and Nuclear Chemistry Letters v1 p125-9 1965. Copies to DDC users only.

Descriptors: (*Complex compounds, Synthesis (Chemistry)), (*Tungsten compounds, Complex compounds), (*Rhenium compounds, Complex compounds), (*Aluminum compounds, Complex compounds), Metalorganic compounds, Chemical bonds, Nuclear magnetic resonance, Exchange reactions, Cyclopentenes, Dienes

A report is made of the synthesis and related studies of two cyclopentadienides, Cp2-WH2-AlMe3 and Cp2 -ReH-AlMe3, which very likely contain new metal-to -metal bonds formed through a donor-acceptor interaction.

AD-630 075 Fld. 7/2
CORNELL UNIV ITHACA N Y DEPT OF CHEMISTRY
BOROXINE. A NEW ROUTE TO BORANE CARBONYL,
by Satish K. Wason, and Richard F. Porter. 23 Aug 65, 2p. Contract DA-31-124-ARO (D)-320, AROD 4890:3

Unclassified report

Availability: Published in Inorganic Chemistry v5 p161-2 1966. Copies to DDC users only.

Descriptors: (*Boron compounds, Synthesis (Chemistry)), (*Borohydrides, Chemical reactions), Carbon monoxide, Chemical equilibrium

It is shown that borane carbonyl, BH3CO (also referred to as carbon monoxide borane) can be obtained from a rapid reaction of boroxine (H3B3O3) and CO (g) at comparatively low pressures and temperatures. Under suitable conditions, this procedure gives yields of BH3CO somewhat higher than that expected from an equilibrium reaction between B2H6 and CO3.

AD-630 086 Fld. 7/2, 7/3, 7/4, 7/5
CFSTI Prices: HC $15.80 MF $1.00
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C
CHEMISTRY PROGRAM REVIEW.
Rept. for Fiscal Year 1961.
15 Dec 61, 162p. Rept. no. AFOSR-964 (1961)

Unclassified report

Descriptors: (*Chemistry, Air Force research), (*Air force research, Chemistry), Synthesis (Chemistry), Materials, Spectroscopy, Laboratory equipment, Chemical reactions, Theory, Reviews

Important advances in AFSOR sponsored work in the fields of new synthesis and materials, spectroscopy, new methods and techniques, chemical reactivity and mechanisms, and theoretical chemistry are reviewed. Chemistry program statistics are outlined. Summaries are included of all research projects during FY61.

AD-630 105 Fld. 7/2, 7/3, 7/4, 7/5
CFSTI Prices: HC $6.60 MF $0.75
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C
CHEMISTRY PROGRAM REVIEW.
Rept. for Fiscal Year 1958.
10 Aug 58, 61p. Rept. no. AFOSR-964 (1958),

Unclassified report

Descriptors: (*Chemistry, Air Force research), (*Air force research, Chemistry), Chemical properties, Surfaces, Synthesis (Chemistry), Laboratory equipment, Reviews

A review is given of highlights of AFOSR sponsored research in areas involving the chemical properties of matter, surface chemistry, chemical synthesis, and new chemical approaches. An outline of chemistry program statistics for FY 1958 is included.

AD-630 106 Fld. 7/2, 7/3, 7/4, 7/5
CFSTI Prices: HC $5.60 MF $0.50
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C

CHEMISTRY PROGRAM REVIEW.
Rept. for Fiscal Year 1959.
10 Aug 59, 57p. Rept. no. AFOSR-964 (1959),
Unclassified report

Descriptors: (*Chemistry, Air force research), (*Air force research, Chemistry), Chemical bonds, Chemical reactions, Reaction kinetics, Thermochemistry, Surfaces, Phase studies, Theory, Reviews

A review is given of highlights of AFOSR sponsored research involving the areas of chemical bonding, reaction mechanisms, surface chemistry, matter and energy interactions, states of matter, and theoretical chemistry. An outline of chemistry program statistics for FY 1959 is included, as is a listing of all projects in progress or completed during that period.

AD-630 107 Fld. 7/2, 7/3, 7/4, 7/5
CFSTI Prices: HC $4.60 MF $0.50
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C
CHEMISTRY PROGRAM REVIEW.
Progress rept. for 1951-1 Jul 55.
15 Aug 55, 43p. Rept. no. AFOSR-964 (1951/1955)
Unclassified report

Descriptors: (*Chemistry, Air Force research), (*Air Force research. Chemistry), High-temperature research, Photography, Materials, Laboratory equipment, Combustion, Thermochemistry, Surfaces, Radiochemistry, Reviews

A review is given of highlights of AFOSR sponsored research, between 1 Jan 51 and 1 July 55, in the areas of high-temperature chemistry, chemistry of photographic processes, chemistry of new inorganic and temperature materials, new chemical principles and techniques, chemistry of combustion and energy release, surface chemistry, and nuclear chemistry. An outline of administrative matters is included, as is a listing of projects in progress or completed during the reporting period.

AD-630 108 Fld. 7/2, 7/3, 7/4, 7/5
CFSTI Prices: HC $3.60 MF $0.50
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C
CHEMISTRY PROGRAM REVIEW.
Progress rept. 1 Jul 55-1 Jul 56.
1 Aug 56, 40p. Rept. no. AFOSR-964 (1956)
Unclassified report

Descriptors: (*Chemistry, Air Force research), (*Air Force research, Chemistry), High-temperature research, Photochemistry, Materials, Theory, Surfaces, Radiochemistry, Free radicals, Reviews

A review is given of highlights of AFOSR sponsored research in the areas of high-temperature chemistry, photochemistry, chemistry of materials, theoretical chemistry, surface chemistry, nuclear chemistry, and free-radical chemistry. An outline of program statistics is included, as is a listing of research progress or completed during FY 56.

AD-630 109 Fld. 7/2, 7/3, 7/4, 7/5
CFSTI Prices: HC $4.60 MF $0.50
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C
CHEMISTRY PROGRAM REVIEW.
Rept. for Fiscal Year 1957.
1 Aug 57, 45p. Rept. no. AFOSR-964 (1957),
Unclassified report

Descriptors: (*Chemistry, Air Force research), (*Air Force research, Chemistry), Chemical bonds, Photochemistry, High-temperature research, Reaction kinetics, Surfaces, Catalysis, Radiochemistry, Reviews

A review is given of highlights of AFOSR sponsored research concerning the theory of chemical bonding, photochemistry, high-temperature chemistry, nonequilibrium kinetics, surface chemistry and catalysis, and nuclear chemistry. An outline of chemistry program statistics is included, as is a listing of chemistry research projects in progress or completed during FY 57.

AD-629 810 **See Fld. 7/3**

AD-629 884 **See Fld. 19/1**

AD-630 002 **See Fld. 7/4**

AD-630 044 **See Fld. 7/1**

AD-630 058 **See Fld. 14/2**

AD-630 078 **See Fld. 7/4**

AD-630 259 **See Fld. 20/2**

AD-630 276 **See Fld. 11/6**

AD-630 499 **See Fld. 7/4**

7/3. ORGANIC CHEMISTRY

AD-629 760 Fld. 7/3
DEFENCE CHEMICAL BIOLOGICAL AND RADIATION LABS OTTAWA (ONTARIO)
CHROMATOGRAPHIC SEPARATION OF THE 1-METHOXY -2 (3)-HYDROXY- 3 (2)-BROMOCYCLOHEXANES AND THEIR DERIVATIVES,
by A. A. Casselman, and R. A. B. Bannard. 13 May 65, 6p. Rept. no. DCBRL-463,
Unclassified report

Availability: Published in Journal of Chromatography v20 p424-8 1965. Copies to DDC users only.

Descriptors: (*Halohydrins, Separation), (*Cyclohexanes, Chromatographic analysis), (*Chromatographic analysis, Cyclohexanes), Bromine compounds, Ethers, Alcohols, Thin layer chromatography, Gas chromatography, Cyclohexanols, Canada

Paper, thin-layer, and vapor-phase chromatographic techniques were examined in an effort to find a suitable method for the separation of the isomeric bromohydrins resulting from the reaction of aqueous N-bromosuccinimide with 1-methoxycyclohexene-2.

AD-629 804 Fld. 7/3
MELLON INST PITTSBURGH PA
METHOXYCARBONYL DERIVATIVES OF THE CYCLOPENTADIENYL METAL CARBONYLS,
by R. B. King, M. B. Bisnette, and A. Fronzaglia. 30 Mar 65, 4p. Contract AF-AFOSR-580-64, AFOSR 66-0314
Unclassified report

Availability: Published in Journal of Organometallic Chemistry, v4 p256-7 1965. Copies to DDC users only.

Descriptors: (*Metal carbonyls, Chemical properties), (*Iron compounds, Metal carbonyls), (*Manganese compounds, Metal carbonyls), Metalorganic compounds, Ethers, Monocyclic compounds, Dienes, Chemical reactions, Synthesis (Chemistry)

A report is given on the preparation of methoxycarbonyl derivatives of the cyclopentadienylmetal carbonyls of iron and manganese and on preliminary studies of their chemical properties.

AD-629 806 Fld. 7/3
WASHINGTON UNIV SEATTLE DEPT OF CHEMISTRY
AN EXAMPLE OF SN1 CLEAVAGE OF A SULFIDE,
by W. M. Schubert, and Yoshiaki Motoyama. 16 Sep 65, 3p. Contract AF-AFOSR-590-64, AFOSR 66-0306
Unclassified report

Availability: Published in Journal of the American Chemical Society v87 p5507-8 1965. Copies to DDC users only.

Descriptors: (*Organic sulfur compounds, Decomposition), Amines, Dynamics, Sulfides, Chemical bonds, Aromatic compounds, Chemical reactions, Spectra (Visible + ultraviolet), Acids, Ions, Ammonium compounds

It has been established that unimolecular carbon-sulfur heterolysis is the rate-controlling step in the conversion of aklyl alpha-dimethylaminobenzyl sulfides to N,N-dimethyl -benzaliminium ion in aqueous acidic media. This appears to be the first authentic instance of an SN1 cleavage of an alkyl-sulfur bond of a sulfide. In pure water, the alkyl alpha-dimethylaminobenzyl sulfides are hydrolyzed to benzaldehyde practically instantly. In dilute aqueous acidic media, in which the substrate is present largely as the nitrogen conjugate acid, SH+, the reaction rate is slow enough to measure. The over-all reaction proceeds quantitatively in two stages: the sulfide to Ph CH N (Me)2 and then to Ph CHO. The report concerns the kinetics of the first stage. First-order rate constants for the stage were obtained by an ultraviolet spectrophotometric method. (Author)

AD-629 809 Fld. 7/3
MELLON INST PITTSBURGH PA
NEW OLEFINIC AND ACETYLENIC COMPLEXES OF TUNGSTEN,
by R. B. King, and A. Fronzaglia. 7 Oct 65, 4p. Contract AF-AFOSR-580-64, AFOSR 66-0315
Unclassified report

Availability: Published in Chemical Communications n21 p548-9 Nov 10 1965. Copies to DDC users only.

Descriptors: (*Metal carbonyls, Tungsten compounds), (*Tungsten compounds, Metal Carbonyls), Alkynes, Hydrocarbons, Complex compounds, Synthesis (Chemistry), Metalorganic compounds

AD-629 810 Fld. 7/3, 7/2
MELLON INST PITTSBURGH PA
ORGANOSULFUR DERIVATIVES OF THE METAL CARBONYLS. VIII. NEW ASPECTS OF THE CHEMISTRY OF METHYLTHIO DERIVATIVES OF IRON CARBONYL,
by R. B. King, and M. B. Bisnette. 14 May 65, 5p. Contract AF-AFOSR-580-64, AFOSR 66-0321
Unclassified report

See also AD-621 316.

Availability: Published in Inorganic Chemistry v4 n11 p1663-65 1965. Copies to DDC users only.

Descriptors: (*Organic sulfur compounds, Metal carbonyls), (*Iron compounds, Metal carbonyls), (*Metal carbonyls, Chemical properties), Carbon monoxide, Thiols, Polymers, Sulfides, Monocyclic compounds, Polycyclic compounds, Halogen compounds, Spectra (Visible + ultraviolet)

The methylthio iron carbonyl (CH3-S-Fe (CO)3)2 (I) was synthesized with 60% yield by heating pentacarbonyl iron with dimethyl disulfide (II) in the presence of CO under pressure. In the absence of CO, the polymeric (CH3-S-Fe (CO)3)n was the major reaction product. I reacts with excess II at atmospheric pressure to form an unidentified pyrophoric solid; with bicyclo (2.2.1)heptadiene-2,5 to form (CH3-S)2-Fe7- (CO)4-C7H8; with cyclooctatetraene to form small amounts of C8H8-Fe (CO)3; and with bromine or iodine to form complex mixtures. The ultraviolet spectra of a number of (RSFe (CO)3)2 compounds are reported.

AD-629 837 Fld. 7/3
EVANS CHEMICAL LAB OHIO STATE UNIV COLUMBUS
A SOLVENT EFFECT IN THE REACTION OF BENZALDESOXYBENZOIN WITH PHOSPHORUS PENTACHLORIDE,
by Melvin S. Newman, and Girts Kaugars. 2 Mar 65, 6p. Contract AF-AFOSR-569-64, AFOSR 66-0320

Unclassified report

Availability: Published in Journal of Organic Chemistry v30 p3105-8 Sep 1965. Copies to DDC users only.

Descriptors: (*Ketones, Chemical reactions), (*Phosphorus compounds, Chlorides), (*Solvents, Chemical reactions), (*Acetophenones, Chemical reactions), Halogenated hydrocarbons, Carbon tetrachloride, Chlorine compounds, Polycyclic compounds, Propenes

Reaction of benzaldesoxybenzoin with phosphorus pentachloride in methylene chloride led to a mixture of products from which 1-chloro- 2,3-diphenylindene was obtained in 30% yield. In a similar reaction in carbon tetrachloride a different mixture of products was obtained from which 3,3-dichloro- 1,2,3-triphenylpropene was isolated in 47% yield. These results are discussed in the light of the fact that phosphorus pentachloride is monomeric in methylene chloride and dimeric in carbon tetrachloride. (Author)

AD-629 838 Fld. 7/3
EVANS CHEMICAL LAB OHIO STATE UNIV COLUMBUS
REACTIONS OF 1,4-DICHLORO-1-BUTENES WITH MAGNESIUM. A NEW CYCLOBUTENE SYNTHESIS.,
by Melvin S. Newman, and Girts Kaugars. 24 May 65, 6p. Contract AF-AFOSR-569-64, AFOSR 66-0319

Unclassified report

Availability: Published in Journal of Organic Chemistry v30 p3295-8 1965. Copies to DDC users only.

Descriptors: (*Halogenated hydrocarbons, Alkenes), (*Alkenes, Chemical reactions), (*Magnesium, Chemical reactions), (*Cyclobutenes, Synthesis (Chemistry)), (*Grignard reagents, Stereochemistry), Chlorine compounds, Aromatic compounds, Reaction kinetics, Molecular isomerism

The reactions of trans-1,4-dichloro-1-phenyl-1-butene and cis-1,4-dichloro-1,2-diphenyl-1-butene with magnesium in ether afford 1-phenylcylobutene and 1,2-diphenylcyclobutene in 5-46 and 90% yields, respectively. A study of the reaction products from I indicates that the reaction of I to form the vinyl Grignard reagent is more rapid than that to form primary Grignard reagent. Evidence that vinyl Grignard reagents do not maintain stereochemical identity is presented. (Author)

AD-629 852 Fld. 7/3
IDAHO UNIV MOSCOW DEPT OF PHYSICAL SCIENCES
TWO NOVEL TETRACYCLO-OCTANES,
by Peter K. Freeman, V. N. Mallikarjuna Rao, and Glen E. Bigam. 13 Sep 65, 5p. Contract AF-AFOSR-34-65, AFOSR 66-0299

Unclassified report

Prepared in cooperation with Alberta Univ., Edmonton. Dept. of Chemistry.

Availability: Published in Chemical Communications n21 p511-2 Nov 10 1965. Copies to DDC users only.

Descriptors: (*Polycyclic compounds, Synthesis (Chemistry)), (*Cyclooctane derivatives, Synthesis (Chemistry)), Chemical reactions, Molecular structure, Nuclear magnetic resonance

A method is described for the generation of tetracyclooctanes by way of appropriate tricyclic cardene intermediates.

AD-629 901 Fld. 7/3
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
THE OXIDATION OF PHENOLS. II. THE OXIDATION OF 2,4-DI-T-BUTYLPHENOL WITH PEROXY RADICALS,
by E. C. Horswill, and K. U. Ingold. 24 Sep 65, 10p.
NRC 8758

Unclassified report

See also AD-629 746.

Availability: Published in Canadian Journal of Chemistry v44 p269-77 1966. Copies to DDC users only.

Descriptors: (*Phenols, Oxidation), (*Peroxides, Oxidation-reduction reactions), (*Ketones, Synthesis (Chemistry), Chemical bonds, Quinones, Cyclohexanones, Canada

Ten products from the oxidation of 2,4-di-t-butylphenol with t-butyl peroxy radicals have been identified. They can be subdivided into three groups, depending on the type of radical-radical coupling reaction by which they are produced or in which their precursors are formed: (i) phenoxy-peroxy coupling, (ii) phenoxy-phenoxy coupling at the 6 positions, and (iii) phenoxy-phenoxy coupling through the oxygen atom of one radical and the 6 position of the second radical. Products resulting from still other phenoxy-phenoxy coupling reactions are undoubtedly formed in minor amounts. (Author)

AD-630 004 Fld. 7/3
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY
HALOMETHYL-METAL COMPOUNDS. III. THE REACTION OF PHENYL (TRIHALOMETHYL)-AND PHENYL (DIHALOMETHYL)-MERCURY COMPOUNDS WITH TRIALKYL PHOSPHITES,
by Dietmar Seyferth, Jeffrey Yick-Pui Mui, and Gurdial Singh. 1965, 3p. Contract DA-ARO (D)-31-124-G-495, AROD 2832:26

Unclassified report

See also AD-623 707.

Availability: Published in Journal of Organometallic Chemistry v5 p185-7 1966. Copies to DDC users only.

Descriptors: (*Metalorganic compounds, Mercury compounds), (*Mercury compounds, Chemical reactions), (*Phosphites, Chemical reactions), Organic phosphorus compounds, Halogenated hydrocarbons, Aromatic compounds, Nuclear magnetic resonance

In AD-617 596 a report was made of the reaction of phenyl (trihalomethyl) and phenyl (dihalomethyl) mercurials with triphenylphosphine in the presence of aldehydes and ketones. In an extension of this work an examination was undertaken of the reactions of these mercurial reagents with trimethyl and triethyl phosphite. The results of this study may be summarized by the equations: C6H5HgCCl2Br + (RO)3P (yields) C6H5HgCCl2P (O) (OR)2 + RBr; C6H5HgCHClBr + (RO)3P (yields) C6H5HgCHClP (O) (OR)2 + RBr.

AD-630 007 Fld. 7/3
CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY
ARYL-SUBSTITUTED PROPARGYL ALCOHOLS AND RELATED COMPOUNDS,
by Thomas L. Jacobs, and Donald M. Fenton. 16 Nov 64, 5p. Contract DA-ARO (D)-31-124-G249, AROD 3299:5

Unclassified report

Availability: Published in Journal of Organic Chemistry v30 p1808-12 Jun 1965. Copies to DDC users only.

Descriptors: (*Alkynes, Alcohols), (*Alcohols, Molecular structure), Halogenated hydrocarbons, Ethers, Aromatic compounds, Chemical reactions, Dienes

The halides prepared from aryl-substituted propargyl alcohols, previously reported to have propargyl structures, were shown to have allenyl structures. Ethers formed from 1,1,3-triphenyl-2-propyn-1-ol or from allenyl halide have propargyl structures. Methyl ethers corresponding to both propargyl and allenyl structures were prepared in the 4,4-dimethyl-1,3-diphenyl-1-pentyn3-ol series. The various acetylene-allene rearrangements involved in reactions of these compounds were explained on the basis of the stabilized carbonium ions. (Author)

AD-630 008 Fld. 7/3
CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY
THE ADDITION OF THIYL RADICALS TO ALLENIC HYDROCARBONS,
by Thomas L. Jacobs, and G. E. Illingworth,Jr.. 5 Nov 62, 8p. Contract DA-ARO (D)-31-124-G249, AROD 3299:6

Unclassified report

Availability: Published in Journal of Organic Chemistry v28 2692-8 Oct 1963. Copies to DDC users only.

Descriptors: (*Organic sulfur compounds, Free radicals), (*Free radicals, Chemical reactions), (*Dienes, Chemical reactions), Butadienes, Alkynes, Thiols, Sulfides, Propanes, Molecular isomerism

Ethane- and benzenethiyl radicals add to allene, 1,2-butadiene, and 3-methyl-1,2-butadiene to give 1:1 and 2:1 adducts. Ethanethiol and allene yield allyl ethyl sulfide, 1,2-bis (ethylthio)propane, and 1,3-bis (ethylthio)propane. Attack is 12.8% on the center carbon and 87.2% on terminal carbons. Attack of ethanethiyl radicals on 1,2-butadiene occurs at all three positions to give cis- and trans-crotyl ethyl sulfide, ethyl alpha-methylallyl sulfide, cis- and trans-2-ethylthio-2 -butene, and meso- and dl-2,3-bis (ethylthio)butane. Interconversion of the allylic isomers occurs to a small extent under the reaction conditions making the relative amounts of attack on the ends of the allenic system slightly uncertain. Attack was 45.5:48.2:6.3 on carbons 1, 2, and 3. Ethane- and benzenethiyl radicals attack 3-methyl-1,2-butadiene exclusively at the center carbon of the allenic system. Additions of ethanethiyl radicals to propyne, 1- and 2-butyne, and 1,3-butadiene were studied. Additions to the allenes do not occur by prior rearrangement to these hydrocarbons and rapid addition of thiyl radicals to them, nor could these hydrocarbons be detected in allenes recovered from addition studies. (Author)

AD-630 009 Fld. 7/3
CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY
3-BROMO- 3-METHYL- 1-BUTYNE, 1-BROMO-3-METHYL- 1,2-BUTADIENE, AND 1-BROMO-3-METHYL- 1,3-BUTADIENE,
by Thomas L. Jacobs, and Walter L. Petty. 9 Oct 62, 8p. Contract DA-ARO (D)-31-124-G249, AROD 3299:7

Unclassified report

Availability: Published in Journal of Organic Chemistry v28 p1360-6 May 1963. Copies to DDC users only.

Descriptors: (*Alkynes, Synthesis (Chemistry)), (*Butadines, Synthesis (Chemistry)), (*Bromine compounds, Synthesis (Chemistry)), Halogenated hydrocarbons, Alcohols, Bromides, Molecular isomerism, Displacement reactions, Decomposition

3-Bromo- 3-methyl- 1-butyne (I) was obtained from 2-methyl- 3-butyn-2-ol by reaction with phosphorus tribromide or thionyl bromide. It was rearranged by cuprous bromide or bromide ion to 1-bromo- 3-methyl1,2-butadiene (II). At 60-80C the latter gave 52% of cis- and trans-1-bromo- 3-methyl- 1,3-butadiene, 28% of the dimer trans-1,2-dibromo- 3,4-di-isopropylidene cyclobutane, and 20% of other dimers and polymers. Displacement reactions of I and II with iodide ion, thiophenoxide ion, and diethylamine were examined. Dehalogenation of I, II, and the dimer by lithium aluminum hydride was also studied. (Author)

AD-630 054 Fld. 7/3
MICHIGAN UNIV ANN ARBOR DEPT OF CHEMISTRY
A CRITICAL EVALUATION OF DIFFERENTIAL REACTION-RATE METHODS EMPLOYED FOR THE SIMULTANEOUS ANALYSIS OF CLOSELY RELATED MIXTURES. PART I. FIRST-ORDER AND PSEUDO FIRST-ORDER METHODS,
by Harry B. Mark, Ronald A. Greinke, and Louis J. Papa. 1965, 26p. Contract DA-31-124-ARO (D)-284,
AROD 5092:1

Unclassified report

See also AD-630 057.

Availability: Published in Proceedings of Society of Analytical Chemists Conference, 1965. Copies to DDC users only.

Descriptors: (*Chemical analysis, Mixtures), (*Reaction kinetics, Chemical analysis), Graphics, Numerical methods + procedures, Errors, Time, Chemical reactions, Concentration (Chemistry)

The experimental variables that enter into the determination of two species by the three differential kinetic methods involving the use of first-order or pseudo first-order reaction conditions are discussed. The three methods evaluated are: the method of proportional equations, (reagent) >> (reactants), the graphical extrapolation method, (reagent) >> (reactants), and the single-point modification of the method of Roberts and Regan, (reagent) << (reactants). (Anal. Chem. 24:360 (1952)). The experimental variables were studied as a function of the concentrations of the species to be analysed, (reactants), time, and the ratio and magnitude of the rate constants. Criteria are presented for selecting the most suitable method, and the optimum conditions for this method, for a given set of experimental conditions. Experimental results obtained for the analysis of binary mixtures are also given that illustrate some of the major conclusions drawn from the error analysis. (Author)

AD-630 057 Fld. 7/3
MICHIGAN UNIV ANN ARBOR DEPT OF CHEMISTRY
METHOD OF PROPORTIONAL EQUATIONS FOR ANALYSIS OF CLOSELY RELATED MIXTURES BY DIFFERENTIAL REACTION RATES WHERE CONCENTRATION OF REAGENTS <<REACTANTS. CONDUCTOMETRIC DETERMINATION OF CARBONYL COMPOUNDS,
by Ronald A. Greinke, and Harry B. Mark,Jr.. 1965, 4p. Contract DA-31-124-ARO (D)-284, AROD 5092:9

Unclassified report

See also AD-630 054.

Availability: Published in Analytical Chemistry v38 p340-3 Feb 1966. Copies to DDC users only.

Descriptors: (*Mixtures, Chemical analysis), (*Reaction kinetics, Chemical analysis), (*Metal carbonyls, Determination), Electrical conductance, Concentration (Chemistry), Time, Amines, Azides, Chemical reactions

A method of proportional equations (or double point method) which is applicable for reactions pseudofirst-order with respect to the reagent is reported. This method has the advantages of Garmon and Reilley's method (Anal. Chem. 34:600 (1962)) plus the additional advantage that small ratio of rate constants--i.e., 2 to 1 or less--can be used. The method was tested by the analysis of several different carbonyl mixtures using the reaction with hydroxylamine hydrochloride and semicarbazide hydrochloride to form oximes. The method could be utilized, however, for any closely related mixtures where the concentration of reagent can be followed experimentally as a function of time.

AD-630 102 Fld. 7/3
WESTERN RESERVE UNIV CLEVELAND OHIO DEPT OF CHEMISTRY
TRIPHENYLGERMYL HYDROPEROXIDE,
by Ralph L. Dannley, and George Farrant. 27 Nov 65, 2p. Contract DA-ARO (D)-31-124-G720,
AROD 5838:1

Unclassified report

Availability: Published in Journal of the American Chemical Society v88 p627 1966. Copies to DDC users only.

Descriptors: (*Germanium compounds, Peroxides), Aromatic compounds, Synthesis (Chemistry), Physical properties, Chemical properties

Triphenylbromogermane was dissolved in dry ether, and 98% hydrogen peroxide was added. The mixture was stirred and dry ammonia gas was bubbled through the solution for 30 sec. The reaction was then quenched by adding water. The ether layer was separated, washed with water (two 10-ml portions), and then dried over magnesium sulfate. The ether was removed in vacuo, and the residue was recrystallized twice from chloroform-hexane to give triphenylgermyl hydroperoxide (0.95 g, 54.5%), mp 135-136.5. The hydroperoxide was also obtained from the reaction of 98% hydrogen peroxide with triphenyl germanium oxide (65% yield) and with triphenylgermanol (60% yield). The hydroperoxide is quite stable and can be stored at -20C without any decomposition. The decomposition of the triphenylgermyl hydroperoxide has a first-order kinetic dependence on hydroperoxide concentration. The energy of activation is 24.0 plus or minus 1.0 kcal/mole. (Extracted)

AD-629 768 See Fld. 7/4

AD-629 798 See Fld. 7/4

AD-629 808 See Fld. 7/4

AD-629 811 See Fld. 7/4

AD-629 825 See Fld. 6/1

AD-629 833 See Fld. 7/5

AD-629 834 See Fld. 7/5

AD-629 835 See Fld. 7/5

AD-629 903 See Fld. 11/6

AD-630 000 See Fld. 7/4

AD-630 006 See Fld. 7/2

AD-630 044 See Fld. 7/1

AD-630 072 See Fld. 7/5

AD-630 078 See Fld. 7/4

AD-630 086 See Fld. 7/2

AD-630 105 See Fld. 7/2

AD-630 106 See Fld. 7/2

AD-630 107 See Fld. 7/2

AD-630 108 See Fld. 7/2

AD-630 109 See Fld. 7/2

AD-630 199 See Fld. 6/15

7/4. PHYSICAL CHEMISTRY

AD-629 754 Fld. 7/4
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO)
FLUORESCENCE AND DEFECT FLUORESCENCE OF ANTHRACENE AT 4.2K,
by W. Helfrich, and F. R. Lipsett. 23 Jul 65, 10p. Rept. no. NRC-8762,

Unclassified report

Availability: Published in The Journal of Chemical Physics v43 n12 p4368-76 Dec 15 1965. Copies to DDC users only.

Descriptors: (*Anthracenes, Fluorescence), (*Fluorescence, Anthracenes), Cryogenics, Excitation, Crystal lattice defects, Spectroscopy, Annealing, Canada

Previous measurements of space-charge-limited hole currents have shown that anthracene crystals, even if very pure, contain large numbers of hole traps distributed exponentially in depth. Arguments are presented that these defects, if structural, should also act as singlet excitation states below the singlet exciton band. In order to detect such excitation states, the following experiments were carried out at 4.2K: (1) observation of fluorescence with ordinary excitation within the singlet absorption band (Nu sub exc> Nu sub 0-0) to check the purity of the anthracene crystals, (2) observation of fluorescence with defect excitation (Nu sub exc<Nu sub 0-0), (3) observation of both kinds of fluorescence after the crystals were annealed at 130C. Some of the ordinary fluorescence spectra showed sharper lines than spectra previously reported. These lines appeared as doublets. Three kinds of defect fluorescence, which depended on the crystal used and on Nu sub exc were observed: (a) fluorescence without structure in its excitation and emission spectra, (b) fluorescence with structured emission spectrum, (c) strong background emission in the ordinary fluorescence. No indications of chemical impurities were found. The results indicate that disordered regions, point defects, and dislocations play a significant role in the fluorescence process. (Author)

AD-629 768 Fld. 7/4, 7/3
CFSTI Prices: HC $4.00 MF $0.75
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
LUMINESCENCE OF COMPLEX MOLECULES: ANALYTICAL SURVEY.
Rept. no. 1 on ATD work assignment no. 79, task 26,
by John J. Kourilo. 18 Jan 66, 104p. Rept. no. ATD-66-9,
TT 66-60749

Unclassified report

Consists of two parts. Part I. Analytical Survey. Part II. Annotated bibliography. Rept. on Surveys of Soviet Scientific and Technical Literature.

Descriptors: (*Luminescence, Complex compounds), (*Complex compounds, Lumines-

cence), Excitation, Organic chemistry, Photoluminescence, Photochemistry, Spectroscopy, Chemiluminescence, Bibliographies, USSR

This analytical survey is based on Soviet-Satellite open sources published in 1963. The report covers the last quarter of 1963 aned is to be considered a continuation of the three ATD reports (two annotated bibliographies and one bibliography) on the same subject which were issued in 1963-1964 and covered the period from July 1962 to September 1963. In addition, some pertinent materials published from April to September 1963 and not covered by the previous ATD report are included in the present report. Materials selected for this report were subdivided into six sections, according to the topics requested, and were arranged according to the prevalent trends found in these materials. Basically, the report consists of two parts. Part One contains a brief analytical survey of data by the forementioned section. Section titles are as follows: (1) General studies (books, reviews, conferences, biographies); (2) Physical state of matter; (3) Lifetime of excited states and quantum yield of luminescence; (4) Electronic spectra of luminescent complex molecules; (5) Internal conversion and transfer of energy; (6) Applications of luminescence. Part Two is an annotated bibliography on which the survey is based and which is arranged in the same sequence as the survey. The selective annotations closely follow the text of the original papers without any comment added by the writer, except for a few references to previous ATD reports. (Author)

AD-629 796 Fld. 7/4
DUKE UNIV DURHAM N C DEPT OF PHYSICS
MILLIMETER-WAVE MOLECULAR-BEAM SPECTROSCOPY: ALKALI FLUORIDES,
by S. E. Veazey, and Walter Gordy. 14 Jan 65, 10p. Contract AF-AFOSR-493-64, Proj. AF-9767, Task 976702,
AFOSR 65-2137

Unclassified report

Availability: Published in The Physical Review v138 n5A pA1303-11 May 31 1965. Copies to DDC users only.

Descriptors: (*Microwave spectroscopy, Fluorides), (*Fluorides, Microwave spectroscopy), Molecular spectroscopy, Alkali metal compounds, Cesium compounds, Rubidium compounds, Potassium compounds, Sodium compounds, Lithium compounds, Spectrophotometers, Molecular rotation, Moment of inertia

Rotational transitions of the alkali metal fluorides CsF, Rb (87)F, Rb (85)F, K (39)F, NaF, and Li (7)F have been measured in the millimeter- and submillimeter-wave regions where no previous measurements existed. The work was accomplished with a high-resolution molecular -beam absorption spectrometer, previously utilized for study of the other halides. A more reliable oven was constructed and used to vaporize the alkali fluorides at temperatures up to 1100C. Measurements on rotational transitions as high as J=27 approaching 28 in the first three vibrational states gave Y01, Y11, and Y21 more accurately, for the most part, than they were previously known, and gave Y02 and Y12 for the first time. From these Dunham rotational constants were derived potential coefficients, moments of inertia, internuclear distances, and vibrational constants. (Author)

AD-629 797 Fld. 7/4
DUKE UNIV DURHAM N C DEPT OF PHYSICS
MOLECULAR FORCE FIELD AND CENTRIFUGAL DISTORTION CONSTANTS OF NITROSYL FLUORIDE,
by R. L. Cook. 30 Nov 64, 8p. Contract AF-AFOSR-493-64, Proj. AF-9767, Task 976702,
AFOSR 65-2136

Unclassified report

Availability: Published in The Journal of Chemical Physics v42 n8 p2927-33 Apr 15 1965. Copies to DDC users only.

Descriptors: (*Microwave spectroscopy, Fluorides), (*Fluorides, Microwave spectroscopy), Ground state, Molecular rotation, Millimeter waves, Spectra (Infrared), Nitrogen compounds, Oxygen compounds, Electron transitions

The microwave spectrum of nitrosyl fluoride, NOF, has been reinvestigated in the microwave region and extended into the millimeter wave region. Some 80 transitions, consisting of both 'a'- and 'b'-type transitions, have been measured and assigned. These data provide the information required for a centrifugal distortion analysis which yields the following ground-state rotational parameters (megacycles per second): A=95 189.77, tau (xxxx)=-0.099630, tau (xzxz)=-0.289581; B=11 844.12, tau (zzzz)=-15.586926, H (JK)=2.339X 10 to the -6th power; and C=10 508.31, tau (xxzz)= 0.418629, H (KJ)=-4.946 X 10 to the -5th power. Combination of infrared data and microwave data yields the following quadratic potential constants millidynes per angstron, f (r1)=2.09, f (r2)=15.08, f (alpha/d squared=1.08, f (r1r2)=1.85, f (r1 alpha/d)=0.17. Here f (r1) and f (r2) are the N-F and N-O bond force constants, respectively, and f (alpha) is the bond-bending force constant. (Author)

AD-629 798 Fld. 7/4, 7/3
UTAH UNIV SALT LAKE CITY DEPT OF CHEMISTRY
EQUILIBRIUM AND KINETIC STUDIES OF THE DEPROTONATION OF THE MONOANION OF SEVERAL DICARBOXYLIC ACIDS IN WATER AND IN DEUTERIUM OXIDE,
by John L. Haslam, Edward M. Eyring, William W.Epstein, Ronald P. Jensen, and Charles W. Jaget. 11 Jun 65, 6p. Contract AF-AFOSR-476-64,PHS-AM-06231 Proj. AF-9710, Task 971003,
AFOSR 65-2370

Unclassified report

Availability: Published in Journal of the American Chemical Society v87 p4247-51 1965. Copies to DDC users only.

Descriptors: (*Dibasic acids, Dissociation), (*Carboxylic acids, Dissociation), (*Succinic acids, Reaction kinetics), (*Dehydrogenation, Chemical equilibrium), Hydroxides, Water, Heavy water, Ions, Cyclopropanes, Esters, Molecular association, Lasers

The rate constant for the rapid abstraction by hydroxide ion of a proton from the monoanion of three alkyl-substituted succinic acids varies inversely as the ratio of the acid dissociation constants Ka1/Ka2. These data confirm the generality of this result found previously for a series of 2,2-disubstituted malonic acids and for three cis-3,3-disubstituted cyclopropane-1,2-dicarboxylic acids. Acid dissociation constants and rate constants for the proton abstraction were also determined in D2O for the three cyclopropane acids as well as for the three succinic acids. These isotopic data as well as acid dissociation constants for the monomethyl esters of these acids are consistent with the interpretation that the breaking of an intramolecular hydrogen bond in the monoanion is rate determining although these data cannot conclusively establish the presence of such an intramolecular hydrogen bond. (Author)

AD-629 807 Fld. 7/4
NORTH CAROLINA UNIV CHAPEL HILL DEPT OF CHEMISTRY
DISCRIMINATING EFFECT OF ADSORBED ASYMMETRIC FILM ELECTRODE TOWARD ELECTROACTIVE METAL COMPLEX ENANTIOMERS,
by Royce W. Murray, and Mutsuo Kodama. 14 Jul 65, 3p. Contract AF-AFOSR-584-64,
AFOSR 66-0301

Unclassified report

Availability: Published in Analytical Chemistry v37 p1759-60 Dec 1965. Copies to DDC users only.

Descriptors: (*Electrodes, Films), (*Complex compounds, Molecular rotation), (*Molecular rotation, Electrochemistry), (*Stereochemistry, Complex compounds), Molecular isomerism, Electrical properties, Copper compounds, Tartrates, Cadmium compounds, Amino acids, Strychnos alkaloids, Adsorption

The planned production of differences in the chemical or physical behavior of optical enantiomers requires an interaction with an optically asymetric environment. Utilization of an optically active electrode surface could provide a route to the electrochemical differentiation of electroactive enantiomeric substances. The communication describes a convenient method for preparation of a useful asymmetric electrode surface and demonstrates, with the chronopotentiometric technique, that the electrochemistry of electroactive enantiomers at such surfaces can be different. (Author)

AD-629 808 Fld. 7/4, 7/3
NORTH CAROLINA UNIV CHAPEL HILL DEPT OF CHEMISTRY
CHRONOPOTENTIOMETRIC STUDY OF PHENYLMERCURIC IQN ADSORPTION ON A MERCURY ELECTRODE,
by R. F. Broman, and Royce W. Murray. 11 May 65, 8p. Contract AF-AFOSR-584-64,
AFOSR 65-2364

Unclassified report

Availability: Published in Analytical Chemistry v37 n11 p1408-14 Oct 1965. Copies to DDC users only.

Descriptors: (*Metalorganic compounds, Electrochemistry), (*Mercury compounds, Adsorption), (*Electrodes, Mercury), Aromatic compounds, Ions, Polarographic analysis, Electrolysis, Reaction kinetics, Chemical equilibrium

Both phenylmercuric ion and the product of its one-electron reduction are strongly adsorbed on a mercury electrode surface. The adsorbed reactant gives rise to polarographic, potential-sweep chronoamperometric, and chronopotentiometric prewaves during which the adsorbed reactant is coulometrically electrolyzed before the diffusing solution reactant is reduced. Adsorption and desorption rates of both reactant and product are slow. A spike on the chronopotentiometric prewave has been interpreted as arising from a relatively slow reorientation process within the adsorbed layer leading to a transient reaction overpotential. (Author)

AD-629 811 Fld. 7/4, 7/3
CHICAGO UNIV ILL INST FOR THE STUDY OF METALS
EXCITED ELECTRONIC STATES OF CRYSTALLINE BENZENE,
by Robert Silbey, Stuart A. Rice, and Joshua Jortner. 22 Jun 65, 9p. Contract AF-AFOSR-781-65, Proj. AF-9760, Task 976001,
AFOSR 66-0322

Unclassified report

Availability: Published in The Journal of Chemical Physics v43 n9 p3336-43 Nov 1 1965. Copies to DDC users only.

Descriptors: (*Benzene, Molecular energy levels), (*Molecular energy levels, Benzene), Crystals, Excitation, Theory, Mathematical analysis, Electron transitions, Crystal structure

The excited electronic states of crystalline benzene are examined with the use of exciton theory. Ion-pair exciton states are considered and it is

shown that these may play a considerable role in etermining the observed spectra. Their effect on the lowest triplet state is also considered. The results of the analysis are in agreement with the available experimental data and are also consistent with the analysis of the spectrum of crystalline naphthalene. (Author)

AD-629 812 Fld. 7/4, 20/12
CHICAGO UNIV ILL INST FOR THE STUDY OF METALS
MOLECULAR RYDBERG TRANSITIONS IN RARE-GAS MATRICES-EVIDENCE FOR INTERACTION BETWEEN IMPURITY STATES AND CRYSTAL STATES,
by E. S. Pysh, Stuart A. Rice, and Joshua Jortner. 12 Jul 65, 11p. Contract AF-AFOSR-781-65, Proj. AF-9760, Task 976001, AFOSR 66-0323

Unclassified report

Availability: Published in The Journal of Chemical Physics v43 n9 p2997-3004 Nov 1 1965. Copies to DDC users only.

Descriptors: (*Helium group gases, Molecular energy levels), (*Molecular energy levels, Helium group gases), (*Solidified gases, Helium group gases), Impurities, Benzene, Alkynes, Ultraviolet spectroscopy, Spectra (Visible + ultraviolet), Absorption spectrum, Cryogenics, Argon, Krypton, Solids, Alloys, Excitation, Electron transitions

As a first step in characterizing molecular Rydberg states in the solid state, the absorption spectra arising from acetylene and benzene impurity states in solid krypton and argon in the far-ultraviolet region were obtained. The first member of the acetylene Rydberg series, which appears at 8.155 eV in the gas phase, is observed to be shifted to 8.67 eV in a krypton matrix and to 9.01 eV in an argon matrix. These large energy shifts are discussed, particularly with reference to the optical spectra of rare -gas solids and rare-gas alloys, where similar large blue shifts are observed. The far-ultraviolet spectra of benzene trapped in krypton and argon matrices show a qualitatively different phenomenon. The Rydberg states of benzene are observed to interact with conduction-band continuum states to exhibit anomalous Fano-type line shapes. The Rydberg states repulse the neighboring continuum states to produce sharp decreases in the continuum absorption intensity. These results are discussed in connection with other systems which show Fano-type line shapes. (Author)

AD-629 813 Fld. 7/4, 20/12
CHICAGO UNIV ILL INST FOR THE STUDY OF METALS
REFLECTION STUDIES OF EXCITONS IN LIQUID AND SOLID XENON,
by David Beaglehole. 23 Aug 65, 5p. Contract AF-AFOSR-781-65, Proj. AF-9760, Task 976001, AFOSR 66-0310

Unclassified report

Availability: Published in Physical Review Letters v15 n13 p551-3 Sep 27 1965. Copies to DDC users only.

Descriptors: (*Xenon, Ultraviolet spectroscopy), (*Carriers (Semiconductors), Xenon), Liquefied gases, Solidified gases, Reflection, Optical phenomena, Crystal lattices, Electrons, Brillouin zones

Reflectivity measurements were made on liquid and solid xenon at various temperatures to study the effects of lattice order on the optical excitations. The exciton lines are found to broaden on making the transition from solid to liquid phase but otherwise the reflectivity spectra are remarkably similar. This result suggests that all the excitons at both high and low energy have essentially an atomic origin, little influenced by crystalline order. (Author)

AD-629 818 Fld. 7/4
WINDSOR UNIV (ONTARIO) DEPT OF PHYSICS
SENSITIZED FLUORESCENCE IN VAPORS OF ALKALI METALS. V. ENERGY TRANSFER IN COLLISIONS BETWEEN CESIUM AND INERT GAS ATOMS,
by M. Czajkowski, D. A. McGillis, and L. Krause. 14 Sep 65, 13p. Contract AF-AFOSR-361-65, AFOSR 66-0400

Unclassified report

Availability: Published in Canadian Journal of Physics v44 p91-103 1966. Copies to DDC users only.

Descriptors: (*Kinetic theory, Gases), (*Cesium, Vapors), (*Helium group gases, Cesium), Kinetic theory, Fluorescence, Atomic energy levels, Electron transitions, Excitation

The total cross sections for excitation transfer between the 6+2P (1/2) and 6 2P (3/2) levels in cesium, induced by collisions of the second kind between cesium and inert gas atoms, have been determined using methods of sensitized fluorescence. The experiments were carried out at a cesium vapor pressure of 1 X 10 to the -6 power mm Hg, at which there is no trapping of resonance radiation, and over a range of inert gas pressures extending from 1 to 300 mm Hg. A mechanism for the excitation transfer is suggested, which involves an interaction between the inert gas atoms and the 6+2P electron in cesium, behaving as afree particle.

AD-629 819 Fld. 7/4, 20/10
BELFER GRADUATE SCHOOL OF SCIENCE YESHIVA UNIV NEW YORK
SCALED PARTICLE THEORY OF FLUID MIXTURES,
by J. L. Lebowitz, E. Helfand, and E. Praestgaard. 25 Mar 65, 7p. Contract AF-AFOSR-508-64, AFOSR 65-2782

Unclassified report

Prepared in cooperation with Bell Telephone Labs., Inc., Murray Hill, N. J. and Copenhagen Univ. (Denmark), Inst. for Physical Chemistry.

Availability: Published in The Journal of Chemical Physics v43 n3 p774-9 1 Aug 1965.

Descriptors: (*Fluids, Particles), (*Mixtures, Fluids), Theory, Spheres, Surface tension, Denmark, Molecular properties, Quantum mechanics

An extension of a previous one-component theory of hard-sphere systems (in three, two, and one dimensions) and the surface tension of real systems is made to mixtures. The theory is based on consideration of an approximate expression for the work of adding an additional hard sphere to a mixture. Comparison between theory and molecular-dynamics calculations of the various contributions to the virial pressure (related to contact distribution functions) of such hard-sphere mixtures is excellent. Comparison of the theory with experimental surface tensions of mixtures of simple liquids is satisfactory. (Author)

AD-629 846 Fld. 7/4
MASSACHUSETTS UNIV AMHERST DEPT OF CHEMISTRY
A STUDY OF PREFERENTIAL SOLVATION UTILIZING NUCLEAR MAGNETIC RESONANCE,
by I. S. Frankel, T. R. Stengle, and C. H. Langford. 26 Jul 65, 4p. Contract AF-AFOSR-212-65, AFOSR 66-0059

Unclassified report

Prepared in cooperation with Amherst Coll., Mass.

Availability: Published in Chemical Communications n17 n.p. Sep 8 1965. Copies to DDC users only.

Descriptors: (*Solvates, Nuclear magnetic resonance), Metalorganic compounds, Cobalt compounds, Chromium compounds, Solvents, Solutions, Organic solvents, Carbon tetrachloride, Benzene, Acetones, Methanols, Paramagnetic materials

Two new methods are reported for the study of preferential solvation utilizing: (1) the effect of solvents on the n.m.r. chemical shift of the solute and, (2) the effect of a paramagnetic solute on the n.m.r. transverse relaxation time of nuclei in the solvent molecules. The interactions in both cases are short range and should isolate contact solvation.

AD-629 849 Fld. 7/4
INDIANA UNIV BLOOMINGTON DEPT OF CHEMISTRY
SMALL-ANGLE SCATTERING FROM METHANE, AMMONIA AND WATER BY FAST ELECTRONS,
by Takao Iijima, Russell A. Bonham, Claude Tavard, Monique Roux, and Marguerite Cornille. 17 Apr 65, 6p. Contract AF-AFOSR-602-64, AFOSR 66-0311

Unclassified report

Availability: Published in Bulletin of the Chemical Society of Japan v38 n10 p1757-60 Oct 1965. Copies to DDC users only.

Descriptors: (*Electron beams, Scattering), (*Methane, Electron bombardment), (*Ammonia, Electron bombardment), (*Water vapor, Electron bombardment), Probability, Wave functions, Intensity, Molecular orbitals

The total differential scattering cross sections for the 40 kV. electron from the methane, ammonia and water molecules obtained experimentally over the $1 < or = s < or = 8$ s range were compared with the theoretical results. Good agreement with the theoretical results was obtained in the case of methane. In the cases of ammonia and water the results are in qualitative agreement with the theoretical predictions, but uncertainties in both the theory and experiment prevent a detailed comparison from being made in these cases. (Author)

AD-629 896 Fld. 7/4, 6/4
CFSTI Prices: HC $1.60 MF $0.50
SPACE-GENERAL CORP EL MONTE CALIF ARTIFICIAL BIOSYSTEMS LAB
RESEARCH AND DEVELOPMENT PROGRAM ON AN ELECTROCHEMICAL ADAPTIVE SYSTEM FOR PATTERN RECOGNITION.
Quarterly progress rept. no. 3. Jan 66, 10p. Contract NOw-65-0470-d,

Unclassified report

See also AD-625 895.

Descriptors: (*Electrochemistry, Adaptive systems), (*Pattern recognition, Adaptive systems), (*Photochemistry, Pattern recognition), (*Adaptive systems, Pattern recognition), Iron, Nitric acid, Photoelectric effect, Optical scanning, Lasers, Ruby

EXCITATION OF PASSIVE IRON SURFACE BY HEATING: A hypothesis is proposed that the passive iron film illuminated in 50-60% HNO3 is being disrupted by the intense heating at the surface occasioned from the ruby laser and that results similar to energy densities of 50,000 watts/sq cm over a period of about 0.5 mec would be obtained over a broad range of incident wavelengths. The hope is that with a strength vs. duration excitiation curve there will result data for designing a scanning image system capable of converting image patterns into parallel travelling patterns of electrochemical excitation in a manner reminiscent of the human eye and retina.

SEARCH FOR RESONANCES IN THE PASSIVE SURFACE LAYER ON IRON IN NITRIC ACID: Molecular or other resonances are sought by using subthreshold illumination. A system of optical filters and/or monochromator with various inherent light sources will be used as well as a light chopper operating in the range of 1 to 100 cps, and a synchronous or narrow-band-tuned voltage detector circuit.

AD-629 937 Fld. 7/4
CFSTI Prices: HC $6.60 MF $0.75
MASSACHUSETTS INST OF TECH CAMBRIDGE FLUID MECHANICS LAB
VARIATIONAL THEORY OF REACTION RATES,
by James C. Keck. Jan 66, 63p. Rept. no. Pub-66-1,
Contract Nonr-1841 (93),
Unclassified report

See also AD-227 520.

Descriptors: (*Chemical reactions, Reaction kinetics), (*Reaction kinetics, Theory), Recombination reactions, Molecular association, Hamiltonian, Monte Carlo method, Mathematical models

The variational theory of reaction rates is reviewed and used to derive a general expression for the reaction rate constant corresponding to the flow of representative points in phase space through any trial surface separating reactants and products. It is shown that unimolecular decay theory, absolute reaction rate theory, available energy theory, and statistical reaction rate theory are all special cases of the variational theory corresponding to different choices of the trial surface. Applications of the theory to three-body recombination and dissociation are considered in detail and expressions for the available energy, three-body collision, Wigner and barrier-rate constants derived and compared. Methods of correcting the theory using Monte Carlo trajectory calculations are discussed. (Author)

AD-629 987 Fld. 7/4
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
STRUCTURE OF THE ELECTRICAL DOUBLE LAYER AT A MERCURY ELECTRODE IN THE PRESENCE OF ADSORBED NITRATE IONS.
Physical sciences research papers,
by Richard Payne. 4 Jun 65, 15p. Rept. no. AFCRL-PSRP-185 ,AFCRL-66-31
Proj. AF-8659, Task 865904,
Unclassified report

Availability: Published in Journal of Physical Chemistry v69 n12 p4113-23 Dec 1965. Copies to DDC users only.

Descriptors: (*Electrodes, Electrical double layer), (*Electrical double layer, Microstructure), (*Nitrates, Adsorption), Mercury, Electrochemistry, Ammonium compounds, Fluorides, Thermochemistry, Hydrates

The adsorption of the nitrate ion on a mercury electrode from mixed solutions of ammonium nitrate and ammonium fluoride has been studied by measuring the double-layer capacity as a function of solution composition at 25C. The adsorption can be described by Frumkin's modification of the Langmuir isotherm with a small repulsive lateral interaction coefficient, a nonlinear charge dependence of the standard free energy of adsorption, and a low saturation coverage. The large apparent area occupied by the adsorbed ion is tentatively interpreted in terms of two-dimensional hydration. The amounts adsorbed are calculated and the capacity is resolved into its component parts with the aid of the isotherm and diffuse-layer theory. The (integral) capacity measured at constnat amount adsorbed decreases linearly with the amount adsorbed, and the capacity measured at constant charge is a function of the charge. These observations are critically discussed in terms of the Grahame-Stern model of the double layer, and an alternative interpretation based on a model of mixed adsorption of the anion and the solvent is suggested. (Author)

AD-630 000 Fld. 7/4, 7/3, 11/9
SYRACUSE UNIV N Y STATE UNIV COLL OF FORESTRY
KINETICS OF ANTHRACENE ADDITION TO POLYSTYRENES POSSESSING ONE OR TWO LIVING ENDS PER CHAIN,
by J. Stearne, J. Smid, and M. Szwarc. 14 Jun 65, 17p. Contract DA-ARO (D)-31-124-G521, AROD 4617:3
Unclassified report

Availability: Published in Transactions of the Faraday Society v62 pt3 n519 p672-87 Mar 1966. Copies to DDC users only.

Descriptors: (*Styrenes, Reaction kinetics), (*Anthracenes, Reaction kinetics), (*Polymers, Reaction kinetics), Complex compounds, Molecular association, Heat of activation, Ionization

The kinetics of the addition of anthracene to living polystyrene was investigated. Two types of polymers were studied: those possessing one active end per chain and others endowed with two active ends in each polymeric molecule. The addition is rapid, but anthracene A has to compete with the resulting product, --S.A (-), M (+) for the active ends. The association of --S (-), M (+) with --SA (-), M (+) is physical in nature, the spectrum of the associate being a superposition of the spectra of its components. Nevertheless, the associated living end is extremely unreactive, and its addition to anthracene is by several powers of 10 slower than that of the free living end. The kinetics of this slow reaction were also investigated. Intermolecular association takes place in systems involving one-living-end polymers, while those possessing two ends per chain undergo an intramolecular association which is faster than the intermolecular reaction. The intermolecular association is not diffusion controlled which indicates the need of activation energy for the physical process. It is probable that the desolvation of the living ends, imperative for the association, is the source of the activation energy. The effects of counterions and degree of ionization on the rates of addition were determined. (Author)

AD-630 002 Fld. 7/4, 7/2
CHICAGO UNIV ILL DEPT OF CHEMISTRY
HIGH-TEMPERATURE CALORIMETRY IN LIQUID OXIDE SYSTEMS. III. THE ENTHALPY OF FORMATION OF MAGNESIUM-ALUMINUM SPINEL,
by A. Navrotsky, and O. J. Kelppa. 4 Oct 65, 2p. Contract DA-ARO (D)-31-124-G616, AROD 5107:4
Unclassified report

See also AD-626 394.

Availability: Published in Inorganic Chemistry v5 n2 p192-3 Feb 1966. Copies to DDC users only.

Descriptors: (*Calorimetry, Spinels), (*Enthalpy, Spinels), (*Spinels, Enthalpy), Heat of solution, Aluminum compounds, Magnesium compounds, Oxides, Borates, High-temperature research

The heats of solution in a lead-cadmium-borate melt at 697 degrees of alpha-alumina, magnesium oxide, and of several synthesized samples of magnesium-aluminum spinel have been determined. From the heats of solution the enthalpy of formation of MgAl2O4, from the component oxides at 697 degrees, was found to be - 8.7 plus or minus 0.3 kcal./mole. (Author)

AD-630 010 Fld. 7/4, 20/8
QUEEN'S UNIV BELFAST (NORTHERN IRELAND) DEPT OF APPLIED MATHEMATICS
A COMPARISON OF THE CROSS SECTIONS FOR IONIZATION OF THE EXCITED STATES OF HYDROGEN BY ELECTRONS CALCULATED USING GRYZINSKI'S CLASSICAL THEORY AND BORN'S QUANTAL THEORY.
Revised ed.,
by A. E. Kingston. 6 Sep 65, 9p. Contract N62558-4297,
Unclassified report

See also AD-624 277, AD-628 656. Revision of manuscript submitted 26 Jul 65.

Availability: Published in Proceedings of the Physical Society v87 p193-200 1966. Copies to DDC users only.

Descriptors: (*Hydrogen, Electron bombardment), (*Electron bombardment, Hydrogen), (*Ionization, Probability), Ground state, Atoms, Quantum theory, Great Britain

The classical calculations agree with the quantal calculations in all cases to better than 14% and in general the agreement is much better. The classical cross sections do not fall off as log (E)/E at larger impact energies E, but the inclusion of the correct high energy fall-off gives classical results which agree with the Born calculations at high energies. (Author)

AD-630 017 Fld. 7/4, 4/1
CFSTI Prices: HC $2.00 MF $0.50
BOEING SCIENTIFIC RESEARCH LABS SEATTLE WASH GEO-ASTRO PHYSICS LAB
UPPER LIMITS FOR CHEMILUMINESCENCE FROM SINGLE COLLISIONS OF 03 WITH NO, CO, H2S, AND CS2,
by Halstead Harrison, and D. M. Scattergood. Jan 66, 26p. Rept. no. d1-82-0480,
Unclassified report

Rept. also available from the authors.

Descriptors: (*Chemiluminescence, Probability), (*Ozone, Chemiluminescence), (*Nitrogen compounds, Monoxides), (*Carbon monoxide, Chemiluminescence), (*Sulfides, Chemiluminescence), Hydrogen compounds, Carbon compounds, Molecular beams, Light, Photons

Double modulated, crossed molecular beam experiments were performed which permit upper limits to be set for the production of light from single, thermal energy collisions of ozone with nitric oxide, carbon monoxide, hydrogen sulphide, and carbon disulphide. Minimum detectable signals were limited by background light levels from a temperature sensitive surface reaction involving ozone. With the apparatus walls cooled by liquid nitrogen, this reaction still generated a partially single-modulated detector noise whose dc count rate was 100/sec. Beam densities were determined with an electron-ionization stagnation detector, operated at 20 cps, and photomultiplier luminous efficiency was measured by comparison with a standard lamp. (Author)

AD-630 055 Fld. 7/4, 20/10
MICHIGAN UNIV ANN ARBOR DEPT OF CHEMISTRY
QUANTUM CHEMISTRY OF ELECTRODE PROCESSES. I. GENERAL RELATIONS FOR ELECTRON EXCHANGE BETWEEN ELECTRODE AND ELECTROACTIVE SPECIES UNDER EQUILIBRIUM AND NONEQUILIBRIUM CONDITIONS,
by Parbury P. Schmidt,Jr., and Harry B. Mark,Jr.. 10 Jun 65, 8p. Contract DA-31-124-ARO (D)-284 ,NSF-GP-4620
AROD 5092:5
Unclassified report

Availability: Published in The Journal of Chemical Physics v43 n9 p3291-7 Nov 1 1965. Copies to DDC users only.

Descriptors: (*Electrodes, Exchange reactions), (*Quantum statistics, Electrodes), (*Electron transitions, Electrochemistry), Electrolytes, Complex compounds, Solvents, Electrical double layer, Ions, Wave functions, Chemical equilibrium, Polarization

It is assumed that at the electrode-solution interface there is molecular order of the electroactive species resembling solid-state order. Specifically, it is assumed that next to the electrode is a layer of adsorbed neutral solvent molecules which are also ligands coordinated to the ions found in the interface. The mechanism of electron transfer from the electrode to the ion or the reverse from the ion to the electrode is assumed initially to involve a transition from either the electrode or the ion to the solvent molecule. This is followed by a transition of the electron from the solvent molecule to either the ion or the electrode. The two transitions involved in the net transfer of an electron across the interface are considered analogous to the charge-transfer mechanism of spectroscopy. The wavefunctions representing the system at the interface are then of the same form as the charge-transfer wavefunctions given by Mulliken. By considering the radiationless transition probabilities for the electron transitions in the interface system at the electrode, it is found that the usual current expressions result. By imposing the condition of zero net current at equilibrium the Nernst equation results. (Author)

AD-630 059 Fld. 7/4
MICHIGAN UNIV ANN ARBOR DEPT OF CHEMISTRY
AN IN SITU SPECTROPHOTOMETRIC METHOD FOR OBSERVING THE INFRARED SPECTRA OF SPECIES AT THE ELECTRODE SURFACE DURING ELECTROLYSIS,
by Harry B. Mark Jr., and B. Stanley Pons. 18 Oct 65, 3p. Contract DA-31-124-ARO (D)-284, AROD 5092:8

Unclassified report

Availability: Published in Analytical Chemistry v38 n1 p119-21 Jan 1966. Copies to DDC users only.

Descriptors: (*Spectra (Infrared), Organic compounds), (*Spectrophotometers, Spectra (Infrared)), Electrodes, Electrolysis, Surface properties, Germanium, Electrochemistry, Quinolinols, Free radicals, Benzenes, Organic nitrogen compounds

Preliminary results are reported for the surface infrared spectra of two organic molecules under electrolysis at a germanium Frustrated Multiple Internal Reflectance (FMIR) electrode. The technique of using FMIR has light from a spectrophotometer focused to enter a specially designed crystal or plate at an angle. If the FMIR plate is also made an electrode, the spectra of species at the electrode surface during electrolysis can be determined directly. The organic molecules studied were from (1) a saturated solution of 8-quinolinol in dimethyl formamide with 0.1 M LiClO4:3H2O as supporting electrolyte and (2) tetramethylbenzidine produced by electroreduction of the stable tetramethylbenzidine free radical, also in dimethyl formamide-LiClO4 solution.

AD-630 062 Fld. 7/4
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
HYPERFINE STRUCTURE AND OCTOPOLE INTERACTION IN STABLE BROMINE ISOTOPES,
by Howard Howland Brown, and John G. King. 22 Jul 65, 7p. Contract DA-36-039-AMC-03200 (E)

Unclassified report

Availability: Published in Physical Review v142 n1 p53-9 Feb 4 1966. Copies to DDC users only.

Descriptors: (*Bromine, Nuclear magnetic resonance), (*Hyperfine structure, Bromine), (*Nuclear moments, Bromine), (*Nuclear Magnetic resonance, Bromine), Stable isotopes, Molecular beams, Electron transitions, Dipole moments, Quadrupole moments, Atomic energy levels

The atomic-beam magnetic-resonance method was used to measure the hyperfine structure of the doublet 2P3/2 ground state of Br79 and Br81. The values obtained for the nuclear dipole, quadrupole, and octopole constants, uncorrected for second-order perturbations, are in cps: Br79 a = 884 811 540 plus or minus 62, b = -384 880 292 plus or minus 200, c = 163 plus or minus 8; Br81 a = 953 770 006 plus or minus 62, b = -321 520 344 plus or minus 200, c = 235 plus or minus 8. The positive value of the nuclear dipole moment was confirmed. (Author)

AD-630 077 Fld. 7/4
CFSTI Prices: HC $3.60 MF $0.50
NOYES CHEMICAL LAB UNIV OF ILLINOIS URBANA
NMR METHODS FOR DETERMINING CHEMICAL EXCHANGE RATES.
Technical rept.,
by Adam Allerhand, H. S. Gutowsky, J. Jonas, and R. Meinzer. 26 Jan 66, 38p. Rept. no. TR-88,
Contract Nonr-1834 (13), Proj. NR-051-215,

Unclassified report

Descriptors: (*Nuclear magnetic resonance, Exchange reactions), (*Exchange reaction, Reaction kinetics), (*Reaction kinetics, Nuclear magnetic resonance), Nuclear spectroscopy, Errors, Mathematical analysis, Experimental data

Factors which affect the accuracy of high-resolution and spin-echo nmr determinations of chemical exchange rates are analyzed and discussed, including mathematical as well as experimental aspects. Numerical methods show that most of the mathematical approximations commonly used to evaluate exchange rates from high-resolution spectra are subject to systematic error, and circumstances under which the error become serious are presented. A line-width equation is derived which gives accurate exchange rates in the vicinity of the coalescence point for an uncoupled AB system, and from which the chemical shift at the coalescence point can be obtained. The effects of saturation broadening are calculated and compared with experiment. In general, it appears desirable to determine exchange rates from high-resolution spectra by using computerized, complete line-shape fitting methods which do not neglect spectral complications unless their effects are demonstrably less than other inaccuracies in the rates. In rate determinations by the spin-echo method which employs a Carr-Purcell train of echoes, it is possible for self diffusion to cause systematic error. Simple criteria are presented for estimating and minimizing such effects. Other presently known factors peculiar to the spin-echo method, including the effects of finite pulse widths, do not appear to present serious problems. (Author)

AD-630 078 Fld. 7/4, 7/2, 7/3
CFSTI Prices: HC $1.60 MF $0.50
NOYES CHEMICAL LAB UNIV OF ILLINOIS URBANA
CARBON-13 MAGNETIC RESONANCE OF DIENE-IRON TRICARBONYL COMPLEXES.
Technical rept.,
by H. L. Retcofsky, E. N. Frankel, and H. S. Gutowsky. 6 Mar 66, 14p. Rept. no. tr-89,
Contract Nonr-1834 (13) Proj. NR-051-215,

Unclassified report

Descriptors: (*Butadienes, Complex compounds), (*Dienes, Complex compounds), (*Metal carbonyls, Complex compounds), (*Iron compounds, Metal carbonyls), (*Complex compounds, Nuclear magnetic resonance), Fatty acid esters, Molecular structure, Chemical bonds, Molecular orbitals, Stereochemistry

The C13 nmr spectra of butadiene-iron tricarbonyl and methyl octadecadienoate-iron tricarbonyl were obtained to elucidate the structure of these complexes. The C13-H coupling constants indicate that all of the C-H bonds in the butadiene complex are essentially sp2 hybrids. This observation, the C13 and proton chemical shifts, the H,H coupling constants and other data are consistent with a structure in which the bonding of Fe at C-2,3 in the diene complexes is very similar to that in ferrocene, but in which the terminal CH2 or CHR groups are rotated about the C1-C2 and C3-C4 bonds of the ligand. This steric distortion of the ligand from planarity makes the bonding of the Fe at C-1,4 differ somewhat from that at C-2,3, but both instances involve pi orbitals on the carbons. (Author)

AD-630 095 Fld. 7/4
OKLAHOMA UNIV NORMAN
LIFETIME OF THE 31P STATE OF HELIUM,
by R. G. Fowler, T. M. Holzberlein, and C. H. Jacobson. 23 Feb 65, 4p. Contract AF 49 (638)-1404,
AFOSR 66-0284

Unclassified report

Availability: Published in Physical Review v140 n4A pA1050-1 Nov 15 1965. Copies to DDC users only.

Descriptors: (*Helium, Atomic energy levels), Life expectancy, Electron transitions

The pressure dependence of the lifetime of the helium transition 3 (1)P-2 (1)S were measured over a wide range of pressure, ranging from free escape to complete blockading. The values of lifetimes so obtained are in good agreement with theory. At pressures beyond 1 mm Hg, quenching is observed corresponding to a probable molecular formation. (Author)

AD-630 099 Fld. 7/4, 21/2
TEXACO EXPERIMENT INC RICHMOND VA
EMISSION SPECTRA OF FLAMES OF NF-CONTAINING OXIDIZERS.
Technical rept.,
by P. L. Goodfriend, and H. P. Woods. Aug 65, 3p. Rept. no. TP-241,EXP-223
Contract Nonr-1883 (00)

Unclassified report

Availability: Published in Combustion and Flame v9 n4 p421-2 Dec 1965. Copies to DDC users only.

Descriptors: (*Fluorides, Spectra (Visible + ultraviolet)), (*Nitrogen compounds, Spectra (Visible + ultraviolet)), (*Oxidizers, Flames), Electric discharges, Band spectrum

An unsuccessful attempt was made to find an absorption spectrum for NF produced by flash photolysis, searching the visible, the near ultraviolet, and part of the vacuum ultra-violet spectral regions. In addition, attempts were made to find an emission spectrum by studying the emission from electrical discharges through NF3 and N2F4. No features that could be ascribed to NF were observed.

AD-630 137 Fld. 7/4, 20/8, 20/9
CFSTI Prices: HC $6.60 MF $0.75
GENERAL ATOMIC SAN DIEGO CALIF
EXPERIMENTAL STUDIES ON HEAVY ION EXCHANGE IN AIR.
Annual summary rept. 24 Aug 64-24 Sep 65,
by W. L. Fite, J. K. Layton, and R. F. Stebbings. Feb 66, 70p. Rept. no. GA-6738,
Contract AF 29 (601)-6614, Proj. AF-5710, Task 07.003,
AFWL TR-65-181

Unclassified report

Descriptors: (*Ion exchange, Air), (*Air, Ion exchange), Electron capture, Stripped atom, Ions, Kinetic theory, Gas ionization, Metals, Gases

Charge-changing collisions between Al, Fe, and U, and the gases Ar, N2, O2, and air have been examined over the velocity range 0.25 to 3.7 x 10 to the minus 8th power cm/sec. Fast particle detection was used to obtain values for the electron-capture cross section sigma sub 10, the ion-stripping cross sections sigma sub 12, sigma sub 13, and sigma sub 14, and the neutral atom-stripping cross section sigma sub 01.-sigma sub 01 for K, Te, and Ag. These sigma sub 01 cross sections are roughly the same for all metal atoms with the exception of U, which was larger. Sigma sub 10 is in all cases almost an order of magnitude smaller than sigma sub 01. Sources for the production of metallic ions are discussed together with general considerations pertaining to experiments using such ions. (Author)

AD-630 141 Fld. 7/4
BRUSSELS UNIV (BELGIUM)
GENERAL EQUATIONS OF EVOLUTION AND KINETIC EQUATIONS FOR NON-UNIFORM SYSTEMS,
by G. Severne. 13 Aug 64, 32p. Contract AF-EOAR-52-64,
AFOSR 66-0392

Unclassified report

Availability: Published in Physica v31 p877-907 1965. Copies to DDC users only.

Descriptors: (*Statistical mechanics, Theory), Kinetic theory, Transport properties, Fourier analysis, Series, Perturbation theory

The methods developed by Prigogine and coworkers are used to establish a rigorous statistical mechanical theory for non-uniform classical systems. The general equations of evolution for the singlet distribution and for the s-body correlation functions are derived, and for the former, an equivalent master equation is written. For large systems these equations are essentially exact; they are non-Markoffian in form and introduce a delocalization in space as well as a displacement in time. The corresponding long time kinetic forms are obtained. In a lowest order approximation, the asymptotic master equation is shown to reduce to the Boltzmann equation, and generalized kinetic equations can immediately be obtained. The resulting formulation of linear transport theory is briefly discussed. (Author)

AD-630 157 Fld. 7/4
JOINT INST FOR LABORATORY ASTROPHYSICS BOULDER COLO
HIGH-ENERGY CROSS SECTIONS FOR ELECTRON EXCITATIONS OF EXCITED HYDROGEN ATOMS IN WHICH THE PRINCIPAL QUANTUM NUMBER IS CHANGED BY 1.
Revised ed.,
by A. E. Kingston, and J. E. Lauer. 15 Oct 65, 8p. Contract DA-31-124-ARO (D)-139, N62558-4297

Unclassified report

Revision of manuscript submitted 26 Aug 65.

Availability: Published in Proceedings of the Physical Society v87 p399-405 1966. Copies to DDC users only.

Descriptors: (*Hydrogen, Nuclear cross sections), (*Excitation, Hydrogen), Atoms, Quantum mechanics, Electron transitions, Atomic energy levels

At large impact energies E the cross section Q for the electron excitation from the n, l state of hydrogen to the n',l' state may be written in the form QE = A log E + B. The first Born approximation is used to calculate these A's and B's for all transitions with n = 1, 2, 3, 4, 5 and 6 and with n' = n+1. The A's and B's associated with the main optically allowed transitions (i.e. l' = 1L+1) are largest. For small values of l, in calculating the B's account must be taken of all other transitions, besides the main optically allowed transitions, for the sum total effect of these minor transitions is almost as large as that of the main optically allowed transitions. These minor transitions can be neglected in calculating the A's for the average cross section from one energy level to another but they increase the B's for the average cross sections by about 25%. (Author)

AD-630 158 Fld. 7/4, 20/13
WASHINGTON UNIV SEATTLE DEPT OF CHEMISTRY
THERMODYNAMIC PROPERTIES OF IRON (II) IODIDE (S) FROM EQUILIBRIUM STUDIES,
by Wayne E. Zaugg, and N. W. Gregory. 23 Aug 65, 5p. Contract DA-ARO (D)-31-124-G461, AROD 2441:14

Unclassified report

Availability: Published in Journal of Physical Chemistry v70 n2 p486-90 Feb 1966. Copies to DDC users only.

Descriptors: (*Iron compounds, Thermodynamics), (*Iodides, Iron compounds), Enthalpy, Entropy, Solids

Thermodynamic properties of FeI2 (s) have been evaluated from an equilibrium study of its decomposition to the elements over the temperature interval 498-585. Values of delta H (f) degrees = -24 plus or minus 1 kcal/mole and S degrees = 41 plus or minus 2 cal/deg/mole at 298.2K are derived. (Author)

AD-630 164 Fld. 7/4, 20/2
MISSOURI UNIV COLUMBIA DEPT OF PHYSICS
MELTING POINT AND GROWTH OF BARIUM TELLURIDE SINGLE CRYSTALS,
Technical rept.,
by Gerald J. Lapeyre, and Eugene B. Hensley. 8 Sep 64, 6p. Rept. no. TR-31, Contract Nonr-2296 (01), Proj. NR-372-081.

Unclassified report

Availability: Published in Journal of Applied Physics v36 n6 p2054-6 Jun 1965. Copies to DDC users only.

Descriptors: (*Barium compounds, Tellurides), (*Melting point, Barium compounds), (*Crystal growth, Barium compounds), Single crystals, Crystal lattices, Test methods, X-ray diffraction analysis

A method is described for determining the melting point of a material by partially melting a long single crystal in a temperature gradient. The melting point of barium telluride was found to be 2070 plus or minus 10C. Single crystals of barium telluride were grown in graphite crucibles using a Bridgeman-Stockbarger technique. A procedure for seeding the melt with a portion of a previously grown crystal is described. The lattice constant for barium telluride was found to vary, depending on the history of the sample, from a value of 7.000A for freshly prepared powder to as low as 6.950A for samples melted in an open crucible. (Author)

AD-630 167 Fld. 7/4
CFSTI Prices: HC $2.60 MF $0.50
HARRY DIAMOND LABS WASHINGTON DC
EXACT SOLUTIONS FOR A SEMI-INFINITE SQUARE LATTICE GAS,
by N. Karayianis, C. A. Morrison, and D. E. Wortman. Feb 66, 24p. Rept. no. TR-1314, Proj. DA-1A010501A015 .HDL-36700

Unclassified report

Descriptors: (*Statistical mechanics, Gases), Phase studies, Thermodynamics, Sequences

The problem of a two-dimensional lattice gad with nearest neighbor infinite repulsion is considered by obtaining exact solutions for a sequence of semi-infinite spaces. The exact solutions are obtained for M x infinity spaces with 2 < or = M < or = 14 in even steps, and although there are no phase transitions in these spaces, a criterion for the point of 'closet approach' to a phase transition is established. The values of the thermodynamic variables evaluated at this point for each M are extrapolated to obtain the properties of the two-dimensionally infinite space. The data indicate a third-order phase transition occurring with probably infinite compressibility at an activity z = 3.799, a density = 0.7356, and a pressure = 0.7914. The density is obtained by a rigorous differentiation of the secular determinant that determines the value of the pressure for a given z, thus securing the accuracy of the calculations and enabling the extrapolated values of the thermodynamic variables to be estimated with good precision. (Author)

AD-630 172 Fld. 7/4, 20/8, 20/10
CFSTI Prices: HC $1.10 MF $0.50
NEW YORK UNIV N Y DEPT OF PHYSICS
CALCULATIONS IN ATOMIC SCATTERING PROBLEMS AND ATOMIC STRUCTURE.
Final rept. 1 May 60-1 Feb 66,
by Sidney Borowitz. 31 Mar 66, 10p. Contract Nonr-285 (49)

Unclassified report

Descriptors: (*Atomic structure, Mathematical models), (*Nuclear scattering, Atoms), (*Electrons, Nuclear scattering), (*Positrons, Nuclear scattering), Atomic orbitals, Approximation (Mathematics), Potential theory, Hydrogen, Bibliographies

Results of studies in the following areas are briefly summarized: (1) derivation of the Thomas-Fermi atomic model from the main body of the Schrodinger equation; (2) low energy scattering of electrons and positrons by atoms; (3) high energy scattering of electrons by atoms. A bibliography of the 46 papers resulting from the studies is included.

AD-630 181 Fld. 7/4, 20/12
TEXAS UNIV AUSTIN
PHASE CHANGES AND ELECTRICAL CONDUCTIVITY OF CONCENTRATED LITHIUM-AMMONIA SOLUTIONS AND THE SOLID EUTECTIC,
by J. A. Morgan, R. L. Schroeder, and J. C. Thompson. 29 Jul 65, 7p. Contract Nonr-3734 (00), Proj. NR-017-457,

Unclassified report

Availability: Published in The Journal of Chemical Physics v43 n12 p4494-9 Dec 15 1965. Copies to DDC users only.

Descriptors: (*Lithium, Solutions), (*Ammonia, Solutions), (*Liquid metals, Models (Simulations)), (*Eutectics, Transport properties), Electrical conductance, Temperature, Phase studies, Melting point, Concentration (Chemistry), Low-temperature research

The electrical conductivities of concentrated solutions of lithium in ammonia were measured over the temperature range 65 to 300K by both conventional dc techniques and electrodeless techniques. In the liquid phase, conductivities ranged from 400 to 15 000 mho/cm at 240K; the temperature coefficient of conductivity varied from +1.0%/deg to zero. Phase changes were indicated by discontinuities in either the conductivity or the temperature derivative of conductivity. No sign of a maximum in the melting-point-vs -concentration curve near the tetra-amine lithium (Li (NH3)4) concentration was found. The eutectic was found to be 89.6 plus or minus 0.3K. The conductivity of the solid was 6.7 times as large as that of the liquid at the melting point. In addition to phase changes in the liquid, two solid-phase changes were observed; one at 82K and the other at 69K. Conductivities in the

solid were decreasing functions of the temperature in each solid phase, yet were higher in the high-temperature solid phases. The highest conductivity observed was 90 000 mho/cm (at 83K). The solid does not behave as do the eutectics of sodium-ammonia or potassium -ammonia solutions. A comparison with other metal -ammonia solutions is made. (Author)

AD-630 211 Fld. 7/4, 7/5
NORTHWESTERN UNIV EVANSTON ILL DEPT OF CHEMISTRY
CHEMICAL KINETICS AS A RELAXATION PROCESS IN A MULTILEVEL SYSTEM. II. GENERAL FORMULATION OF THE MANY-SHOT EXPANSION,
by R. V. Serauskas, and E. W. Schlag. 24 Feb 65, 8p. Contract AF-AFOSR-524-64, AFOSR 65-2120

Unclassified report

Availability: Published in The Journal of Chemical Physics v43 n3 p898-902 Aug 1 1965. Copies to DDC users only.

Descriptors: (*Photolysis, Reaction kinetics), (*Reaction kinetics, Statistical mechanics), (*Molecular energy levels, Reaction kinetics), Relaxation time, Transport properties, Molecular beams, Matrix algebra, Electron transitions, Probability

For a complete understanding of rates in chemical kinetics it is necessary to analyze kinetic processes on the molecular level. For such an analysis one must know the change in the distribution of internal energy as the result of a collision process. It is suggested that this information can be obtained from an analysis of weak-collision terms in a reacting system excited to a nonequilibrium distribution from which it relaxes by way of a many-level process. The relaxation problem in a nonequilibrium multilevel system weakly coupled to a heat bath can be expressed in terms of a Pauli master equation. It has previously been shown that this relaxation problem can be solved in terms of a many-shot expansion, the leading term being the strong-collision result and further terms being due to weak collisions. In this paper it is shown that this many-shot expansion can be derived from a generalized matrix form of the master equation, as well as by the phenomenological approach used previously. Furthermore, a matrix form for a generalized nearest-neighbor model is analyzed and developed in terms of a series which considers the asymptotic contributions of upward transitions in terms of successively less-probable Markov chains. (Author)

AD-630 219 Fld. 7/4, 20/9
MINNESOTA UNIV MINNEAPOLIS DEPT OF ELECTRICAL ENGINEERING
ION MOBILITIES IN HELIUM,
by J. M. Madson, H. J. Oskam, and L. M. Chanin. 29 Nov 65, 3p. Contract Nonr-710 (37) ,AF 19 (628)-4794

Unclassified report

Availability: Published in Physical Review Letters v15 n26 p1018-20 Dec 27 1965. Copies to DDC users only.

Descriptors: (*Helium, Mobility), (*Ions, Helium), Ions, Gases, Atoms, Gas ionization, Molecules, Diffusion

A system was constructed which combines ion-transittime measurements with simultaneous mass analysis. The ions are extracted from a high-voltage short-duration pulsed discharge. After passing through the drift region under the influence of a known uniform electric field, part of the ions enter, through a 100 microns aperture, into a quadrupole mass spectrometer where they are mass analyzed. Preliminary studies using this measuring system indicate the presence of three helium ions having distinctly different mobilities. The mobility values of these ions is shown as a function of E/p (o) (electric field to reduced gas-pressure ratio) at a helium pressure of 3.62 Torr. The lower set of data refers to the atomic helium ion. The upper two sets of data both refer to ions of mass 8. One set of mobility data lies in the vicinity of 16 sq cm/V.sec, while the other lies in the vicinity of 20 sq cm/V.sec. It is believed that the helium ion of mass 8 having a mobility of about 20 sq cm/V.sec is a newly formed helium ion, while the other helium ion of the same mass but having a mobility of about 16 sq cm/V.sec is a helium ion which has been aged. (Author)

AD-630 226 Fld. 7/4
YALE UNIV NEW HAVEN CONN
CORRECTION TO THE (HE3,2-TRIPLET-S SUB 1) TO (HE3 (+),2-DOUBLET-S SUB 1/2) HYPERFINE-STRUCTURE RATIO.
Revised ed.,
by Morton M. Sternheim. 2 Aug 65, 4p. Contract AF-AFOSR-249-65, AFOSR 66-0369

Unclassified report

Revision of manuscript submitted 7 Jul 65.

Availability: Published in Physical Review Letters v15 n8 p336-7 Aug 23 1965. Copies to DDC users only.

Descriptors: (*Helium, Hyperfine structure), (*Hyperfine structure, Helium), Ions, Atomic energy levels, Line spectrum

There has been a discrepancy in the ratio of the 2-tripletS sub 1 state hfs of the He3 atom to the 2-doublet-S sub 1/2 state hfs of the He3 (+) ion, the calculated value being too large by 10 ppm. The purpose of this note is to point out the omission of a correction of -4 ppm in this theoretical ratio. (Author)

AD-630 232 Fld. 7/4
YALE UNIV NEW HAVEN CONN DEPT OF PHYSICS
VACUUM POLARIZATION CORRECTIONS TO HYPERFINE STRUCTURE IN MUONIC ATOMS.
Revised ed.,
by Morton M. Sternheim. 29 Dec 64, 6p. Contract AF-AFOSR-249-64, Proj. AF-9767, Task 976702, AFOSR 66-0372

Unclassified report

Revision of manuscript submitted 22 Oct 64.

Availability: Published in The Physical Review v138 n2B pB430-2 Apr 26 1965. Copies to DDC users only.

Descriptors: (*Hyperfine structure, Polarization), (*Muons, Hyperfine structure), Nuclear structure, Vacuum, Atoms, Numerical analysis, Hydrogen, Helium, Lithium, Beryllium, Boron, Carbon, Nitrogen, Fluorine, Oxygen

Measurement of the hyperfine-structure splitting in muonic atoms would be interesting in view of the discrepancies in electronic atoms. In muonic atoms, nuclear-structure effects are much larger than the uncertainty in the fine-structure constant and may therefore be observed unambiguously. The various corrections are briefly discussed, and the large vacuumpolarization correction is calculated. (Author)

AD-630 297 Fld. 7/4, 20/10
CALIFORNIA UNIV BERKELEY DEPT OF PHYSICS
RELATIVISTIC CORRECTIONS TO THE FINE STRUCTURE OF HELIUM.
Revised ed.,
by Kee Yong Kim. 17 Jun 65, 9p. Contract AF-AFOSR-130-63, AFOSR 66-0380

Unclassified report

Revision of manuscript submitted 2 Dec 64.

Availability: Published in The Physical Review v140 n5A pA1498-1504 Nov 9 1965. Copies to DDC users only.

Descriptors: (*Helium, Hyperfine structure), (*Hyperfine structure, Helium), (*Relativity theory, Hyperfine structure), Line spectrum, Atomic energy levels, Hamiltonian, Equations

Relativistic corrections to the fine structure of the hydrogen atom have been calculated by many authors, but the experimental confirmation of the theory, or alternatively the determination of the numerical value of the fine-structure constant alpha, is limited to an accuracy of 1/100000 because of the short lifetime of 2-doublet-P states of hydrogen. However, in view of the fact that 2-triplet-P states of helium have a longer lifetime, we expect that the finestructure intervals of the 2-triplet-P states of helium can be measured to an accuracy of 1/1,000,000 or better. With this expectation, an attempt was made to evaluate semirelativistically the theoretical formula for the helium fine structure to the order alpha to the 4th Ry. (Author)

AD-630 339 Fld. 7/4, 4/1, 14/2
CFSTI Prices: HC $2.00 MF $0.50
MCGILL UNIV MONTREAL (QUEBEC)
STOM RECOMBINATION ON SURFACES.
Final rept. Mar 63-Aug 65,
by J. E. Morgan, and H. I. Schiff. Nov 65, 47p. Contract AF 19 (628)-2425, Proj. AF-6687, Task 668702, AFCRL 66-64

Unclassified report

Descriptors: (*Atoms, Recombination reactions), (*Hydrogen, Recombination reactions), (*Nitrogen, Recombination reactions), (*Oxygen, Recombination reactions), (*Recombination reactions, Surfaces), Stainless steel, Nickel, Chromium, Titanium, Probes (Electromagnetic), Heaters, Thermistors, Reaction kinetics, Samplers, Materials, Canada

The recombination coefficients of atomic hydrogen, nitrogen and oxygen on stainless steel, nickel, chromium and titanium were estimated from measurements of the energy dissipated at the test surface. The test specimens were in the form of cylindrical probes containing heating elements and small bead thermistors as temperature sensing elements. Changes in temperature sensing elements. Changes in temperature of the test probes of less than 0.02C could be readily detected. Values of the measured recombination coefficients varied from 0.05 (O on Ni) to less than 0.0001 (H, O and N on Ti). (Author)

AD-630 348 Fld. 7/4, 20/2
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH WRIGHT-PATTERSON AFB OHIO
CRYSTAL-FIELD AND SPIN-ORBIT MATRIX ELEMENTS FOR TRANSITION METAL IONS WITH CUBIC SYMMETRY,
by Robert N. Euwema. 28 Sep 64, 10p. Rept. no. ARL-65-193,

Unclassified report

Availability: Published in The Journal of Chemical Physics v42 n3 p892-7 Feb 1 1965. Copies to DDC users only.

Descriptors: (*Transition metals, Band theory of solids), (*Band theory of solids, Matrix algebra), Ions, Atomic energy levels, Wave functions, Hamiltonian, Field theory

Matrix elements which are diagonal with respect to the cubic field are given for the crystal-field and spin-orbit Hamiltonians for the transition metal d-electron configurations. A multiplication factor, the free-ion reduced matrix element, is not included in the tables given. (Author)

AD-630 370 Fld. 7/4, 20/6, 8/7
LINCOLN LAB MASS INST OF TECH LEXINGTON
PARTICLE SIZES OF CLAY MINERALS BY SMALLANGLE X-RAY SCATTERING,
by Ronald J. Arnott. 1965, 14p. Rept. no. JA-2580,
Contract AF 19 (628)-5167,
ESD TDR-66-37

Unclassified report

The American Mineralogist v50 p1563-75 Oct 1965.

Descriptors: (*X rays, Scattering), (*Particle size, Determination), (*Clay minerals, Particle size), Diffraction analysis, Montmorillonite, Kaolinite

The paper describes an investigation of small-angle x-ray scattering as a possible technique for determining the particle size of clay minerals. The method used is that of Shull and Roess (Jour. Appl. (Phys. 18:295-307 (1947)) involving a graphical comparison of experimental scattering curves with theoretical curves. In theory, both the distribution of particle sizes and the shape of the particles should be obtainable, but in this study the particle shape was assumed. Descriptions of the method and of the two-crystal spectrometer used to collect the scattering data are included as well as data obtained for nineteen clay samples. (Author)

AD-630 393 Fld. 7/4
CFSTI Prices: HC $1.60 MF $0.50
INDIANA UNIV BLOOMINGTON
INELASTIC ELECTRON SCATTERING FROM ATOMS AND MOLECULES AT MEDIUM ENERGIES.
Final rept. 1962-65,
by Russell Bonham. 1965, 11p. Contract AF-AFOSR-602-64,
AFOSR 66-0605

Unclassified report

Descriptors: (*Electron diffraction analysis, Molecular structure), (*Atoms, Inelastic scattering), (*Molecular structure, Electron diffraction analysis), Spectrum analyzers, Gases, Electron bombardment, Chemical bonds, Hydrogen, Ammonia, Methane, Water vapor, Aromatic compounds

The purpose of the project was to make use of all the information that can be garnered from electron scattering from molecules to obtain detailed information about the structure of molecules. The design and construction of an electron spectrometer was undertaken. Various theoretical studies necessary for the proper interpretation of experimental results were also carried out. Achievements include the calculation of the effect of chemical binding on gas electron diffraction patterns and the experimental observation of this effect in the molecules H2, NH3, CH4 and H2O. New techniques were developed for the solution of the molecular and atomic integrals needed in the calculation of theoretical electron diffraction intensity curves for comparison with experiment. Partial wave elastic scattering factor calculations were carried out for a number of atoms and new least squares and auto correlation techniques were devised for the refined analysis of electron diffraction data in order to obtain precise molecular parameters. In addition the molecular structures of the compound C6C14H2, C6Br6, cycloheptatriene and perylene were carried out to test these newly developed techniques.

AD-630 400 Fld. 7/4, 20/4
AVCO EVERETT RESEARCH LAB EVERETT MASS
A BIMODAL APPROXIMATION FOR REACTING TURBULENT FLOWS: I. DESCRIPTION OF THE MODEL,
by Shao-Chi Lin. 20 Sep 65, 8p. Rept. no. AMP-184,
Contract AF 04 (394)-414 ,DA-19-020-AMC-0210

Unclassified report

Presented as Preprint 65-37 at the AIAA Aerospace Sciences Meeting (2nd), New York, Jan 25-27 1965.

Availability: Published in AIAA Journal v4 n2 p202-9 Feb 1966. Copies to DDC users only.

Descriptors: (*Turbulence, Reaction kinetics), (*Reaction kinetics, Turbulence), Approximation (Mathematics), Mathematical models, Fluid mechanics

An approximate method is proposed for calculating the rates of chemical reactions and of dissipation of mean-square fluctuations of chemical species in turbulent flowfields with large scale initial inhomogeneities under certain restrictive conditions. The method consists of dividing, in a statistical sense, any initially identifiable fluid element into two distinct volume fractions: a fraction psi, which survives the viscous dissipation or diffusive smearing process, and another fraction (1 - psi), which does not. The Lagrangian time history for the chemical reactions in the volume fraction psi is assumed to be identical to that in an inviscid stream-tube flow in spite of the convective distortions. The chemical reaction history for the remaining fraction (I - psi) is to be determined by the reaction rates in a locally homogeneous mixture of all the neighboring fluid elements that have suffered diffusive smearing. The effects of turbulent transport of both the diffused and nondiffused fractions are represented by the same known function involving the initial coordinates of the fluid element. The spatial variation of psi is then determined by a competition between the local rate of production of inhomogeneity due to turbulent transport and the rate of depletion of inhomogeneity due to diffusive smearing. The simplifying assumptions required to render the problem determinate are briefly discussed. (Author)

AD-630 457 Fld. 7/4, 20/2, 11/6
CFSTI Prices: HC $1.00 MF $0.50
HARVARD UNIV CAMBRIDGE MASS DIV OF ENGINEERING AND APPLIED PHYSICS
PRESSURE DEPENDENCE OF INTERSITIAL-SUBSTITUTIONAL DISSOCIATIVE DIFFUSION.
Technical rept.,
by T. R. Anthony, B. F. Dyson, and D. Turnbull. Jan 66, 11p. Contract SD-88,
ARPA 21

Unclassified report

Descriptors: (*Diffusion, Metals), Crystal lattice defects, Heat of activation, Silver, Gold, Lead, Solid solution, Pressure

The pressure dependence of the diffusivity of a solute existing in a substitutional-interstitial equilibrium is derived for the case where the interstitial solute's diffusion constant is much larger than its substitutional diffusion constant. The results, applied to the diffusivity of silver and gold in lead, show that these solutes dissolve almost completely interstitially in lead. (Author)

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CFSTI Prices: HC $1.00 MF $0.50
HARVARD UNIV CAMBRIDGE MASS DIV OF ENGINEERING AND APPLIED PHYSICS
THE DIFFUSION OF GOLD AND SILVER IN TIN SINGLE CRYSTALS.
Technical rept.,
by Brian F. Dyson. Jan 66, 16p. Contract SD-88,
ARPA 22

Unclassified report

Descriptors: (*Diffusion, Metals), (*Gold, Diffusion), (*Silver, Diffusion), (*Tin, Single crystals), Heat of activation, Anisotropy, Crystal lattice defects, Solid solutions

The diffusivities D, of gold and silver in high purity tin have been measured along the 'C' and 'a' directions in the temperature range 135-225C. The results are characterized by a very large anisotropy of diffusion compared with that found for the self diffusion of tin. Furthermore, these solutes diffuse orders of magnitude faster than the self diffusion of tin and also they diffuse fastest along the 'c' direction, whereas tin diffuses fastest along the 'a' direction. This unusual behavior is interpreted as evidence that silver and gold dissolve interstitially in tin and diffuse by an interstitial mechanism.

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CFSTI Prices: HC $1.00 MF $0.50
HARVARD UNIV CAMBRIDGE MASS DIV OF ENGINEERING AND APPLIED PHYSICS
INTERSTITIAL DIFFUSION OF COPPER AND SILVER IN LEAD.
Technical rept.,
by B. F. Dyson, T. Anthony, and D. Turnbull. Dec 65, 23p. Contract SD-88,
ARPA 20

Unclassified report

Descriptors: (*Copper, Diffusion), (*Silver, Diffusion), (*Lead, Absorption (Physical)), Tracer studies

The diffusivities, D, of copper and silver in high purity lead have been measured by a radioactive tracer technique. The results, in combination with those of Seith and Keil and Ascoli et al., show that the rates of diffusion of the noble metals in lead are several orders of magnitude greater than the self diffusion rate of lead, D sub Pb. We have found that D sub Pb is not measurably affected by the dissolution of either gold, in agreement with Seith and Keil, or of copper. The results indicate that neither the vacancy, interstitialcy nor exchange mechanisms are predominant in the diffusion of these solutes. It is concluded that the noble metals are dissolved in lead at least partially in the interstitial state and that they diffuse almost wholly by an interstitial mechanism. (Author)

AD-630 461 Fld. 7/4, 20/13
CFSTI Prices: HC $7.00 MF $1.50
NATIONAL BUREAU OF STANDARDS WASHINGTON D C
TABLE OF THERMODYNAMIC PROPERTIES AND CHEMICAL COMPOSITION OF NITROGEN IN CHEMICAL EQUILLIBRIUM INCLUDING SECOND VIRIAL CORRECTIONS FROM 1600K TO 15,000K.
Technical rept.,
by Joseph Hilsenrath, and Max Klein. Apr 66, 309p.
AEDC 66-65

Unclassified report

AEDC-TDR-63-162 superseded.

Descriptors: (*Nitrogen, Thermodynamics), Chemical equilibrium, Dissociation, Ionization, Equations of state, Density, Enthalpy, Entropy, Tables

Tables for the thermodynamic properties for nitrogen are presented which take into account the effect of dissociation and ionization and the limiting-law Debye-Huckel and second virial corrections, upon the thermodynamic properties and the equilibrium compositions. Values are tabulated from 1600K in steps of 100K to 15,000K at close spacings in the logarithm of the density (log10 RHO/RHO-null = -7.0 (0.2)2.2) for the compressibility factor Z = PV/RT; the dimensionless functions for: internal energy, E/RT; enthalpy, H/RT; entropy, S/R; log10 P (atm) and Z* = Sigma (C sub i) and the mole fractions of the species in chemical equilibrium. The underlying equations and the input data are discussed briefly. The effects of the real gas corrections on the equilibrium properties are illustrated graphically. The equilibrium composition is given for selected temperatures over the tabulated density range. The wide range of temper-

atures and densities over which the thermodynamic properties have been tabulated make the tables useful in a variety of engineering design and test programs, and in scientific research and development. (Author)

AD-630 467 Fld. 7/4, 11/6, 20/13
CFSTI Prices: HC $1.00 MF $0.50
ARMY MATERIALS RESEARCH AGENCY WATERTOWN MASS MATERIALS RESEARCH DIV
HIGH-TEMPERATURE EQUILIBRIUM IN THE GERMANIUM NICKEL SYSTEM AND THE DISSOCIATION ENERGY OF GENI.
Technical rept.,
by Arthur Kant. Dec 65, 21p. Proj. D/A-1C04501B13A
AMRA TR-65-33
Unclassified report

Descriptors: (*Diatomic molecules, Thermochemistry), (*Thermochemistry, Germanium alloys), (*Germanium alloys, Nickel alloys), Dissociation, Energy, Vapors, Thermodynamics, Chemical equilibrium, High-temperature research, Enthaly, Heat of formation, Chemical reactions, Mass spectroscopy

The GeNi molecule has been shown to exist in the vapor phase over liquid solutions of germanium and nickel above 2000 K. Using information derived from a combination of effusion and mass spectrometric techniques, the energies and equilibrium constants of the gaseous reactions GeNi + Ge = Ge2 + Ni and GeNi = Ge + Ni have been calculated. The values of the energy assuming a singlet sigma ground state of GeNi are GeNi + Ge = Ge2 + Ni delta internal energy = 1.6 plus or minus 4 kcal and GeNi = Ge + Ni dissociation energy (GeNi) = 66.4 plus or minus 4 kcal. The dissociation energy of Ge2 was also determined and the value of 64.9 plus or minus 3 kcal confirms results obtained previously. (Author)

AD-630 495 Fld. 7/4, 20/6
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
ELECTRONIC SPECTRA OF SOLUTIONS OF EUROPIUM AND YTTERBIUM IN LIQUID AMMONIA,
by D. S. Thompson, D. W. Schaefer, and J. S. Waugh. 21 Sep 65, 2p. Contract DA-36-039-AMC-03200 (E)
Unclassified report

Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.

Availability: Published in Inorganic Chemistry v5 p325-6 1966. Copies to DDC users only.

Descriptors: (*Europium, Absorption spectrum), (*Ytterbium, Absorption spectrum), Ammonia, Liquefied gases, Solutions, Paramagnetic resonance, Ground state, Electron spin resonance, Spectra (Visible + ultraviolet)

AD-630 498 Fld. 7/4, 20/13
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
TEMPERATURE AND PRESSURE DEPENDENCE OF SELF-DIFFUSION IN LIQUID ETHANE,
by C. G. Wade, and J. S. Waugh. 22 Jul 65, 3p. Contract DA-36-039-AMC-03200 (E)
Unclassified report

Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.

Availability: Published in The Journal of Chemical Physics v43 n10 p3555-7 Nov 15 1965. Copies to DDC users only.

Descriptors: (*Alkanes, Diffusion), Temperature, Pressure, Nuclear magnetic resonance, Equations of state, Liquefied gases

The self-diffusion coefficient of ethane was measured by the spin-echo method in the liquid range between 155 and 298K and at pressures between the vapor pressure and 2200 atm. The results, interpreted with the help of an approximately determined equation of state, are inconsistent with simple free volume and activated diffusion theories. (Author)

AD-630 499 Fld. 7/4, 7/2
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
LONG-WAVE INFRARED SPECTRA OF ALKALI SALTS OF PLATINUM HALIDE COMPLEXES.
Revised ed.,
by J. H. Fertel, and C. H. Perry. 30 Apr 65, 7p. Contract DA-36-039-AMC-03200 (E) ,NSF-G19637
Unclassified report

Revision of manuscript submitted 11Jan 65.

Availability: Published in The Journal of Physics and Chemistry of Solids v26 p1773-8 1965. Copies to DDC users only.

Descriptors: (*Spectra (Infrared), Complex compounds), (*Complex compounds, Spectra (Infrared)), Inorganic compounds, Alkali metal compounds, Salts, Platinum compounds, Halides, Crystal lattices, Vibration, Chemical bonds, Absorption spectrum, Raman spectroscopy

The absorption spectra of a number of alkali salts of platinum metal halide complexes were investigated using a vacuum far-infrared spectrometer. Lattice vibrations and the stretching and bending frequencies of the metal -halogen bonds were observed in the range 40-360/cm. The compounds, which are of the type R2XY4 (square planar anion), were examined both at room temperature and at liquid nitrogen temperature. The assignment of the normal modes were made and the force constants of the vibrational motions have been calculated using a valence force field model. (Author)

AD-630 501 Fld. 7/4
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
SIMPLE CLASSICAL MODEL FOR THE SCATTERING OF GAS ATOMS FROM A SOLID SURFACE,
by R. M. Logan, and R. E. Stickney. 5 Aug 65, 7p. Contract DA-36-039-AMC-03200 (E)
Unclassified report

Availability: Published in The Journal of Chemical Physics v44 n1 p195-201 Jan 1 1966. Copies to DDC users only.

Descriptors: (*Molecular beams, Scattering), Atoms, Gases, Solids, Surfaces, Theory, Potential theory, Distribution functions

A simple classical model for the scattering of gas atoms from a solid surface is proposed and its characteristics are determined. The principal assumptions are (1) the interaction of a gas atom with a surface atom is represented by an impulsive force of repulsion, (2) the gas-surface intermolecular potential is uniform in the plane of the surface (hence the interaction does not change the tangential velocity of the gas particle), (3) the surface atoms are represented by independent particles confined by square-well potentials, (4) the surface atoms have a Maxwellian velocity distribution. The model incorporates many of the same features as that proposed by Goodman. As a result of these assumptions, the model is simplified to the extent that it contains no adjustable constants. Results are obtained for the angular distribution of the scattered particles. Significant quantative results are not expected from such a simple model, but the qualitative behavior of the model does agree surprisingly well with the experimental results. The model correctly predicts the general appearance of the scattering pattern and its dependence on the angle of incidence of the beam and on the temperatures and masses of the gas and surface atoms. It is concluded that, contrary to the assumption often made in theoretical studies of gas-surface interactions, the temperature of the surface is a significant parameter when considering the existing experimental data. (Author)

AD-630 505 Fld. 7/4
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA
FORMATION OF H (-) BY ELECTRON IMPACT ON H2 AT LOW ENERGY,
by G. J. Schulz, and R. K. Asundi. 15 Nov 65, 3p.
Unclassified report

Prepared in cooperation with Advanced Research Projects Agency through the U. S. Office of Naval Research.

Availability: Published in Physical Review Letters v15 n25 p946-8 20 Dec 1965. Copies to DDC users only.

Descriptors: (*Hydrogen, Electron bombardment), Ions, Dissociation, Probability, Isotopes

A report is made of the formation of the atomic-hydrogen negative ion by electron impact on H2 very close to the theoretical threshold for the production of H (-) and H with zero kinetic energy, via the process e + H2 to H (-) + H. It is found that H (-) formation has a very sharp onset at an electron energy of 3.73 plus or minus 0.07 eV and a very steeply rising, albeit small, cross section which peaks very close to its onset. This observation leads to a better understanding of the potential energy curves of the H2 (-) system and has a bearing on the interpretation of vibrational excitation in H2. (Author)

AD-629 776 See Fld. 11/2
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AD-629 924 See Fld. 20/9
AD-629 958 See Fld. 14/2
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AD-630 412 See Fld. 11/6
AD-630 455 See Fld. 20/5
AD-630 456 See Fld. 20/10

AD-630 370 Fld. 7/4, 20/6, 8/7
LINCOLN LAB MASS INST OF TECH LEXINGTON
PARTICLE SIZES OF CLAY MINERALS BY SMALLANGLE X-RAY SCATTERING,
by Ronald J. Arnott. 1965, 14p. Rept. no. JA-2580,
Contract AF 19 (628)-5167,
ESD TDR-66-37

Unclassified report

The American Mineralogist v50 p1563-75 Oct 1965.

Descriptors: (*X rays, Scattering), (*Particle size, Determination), (*Clay minerals, Particle size), Diffraction analysis, Montmorillonite, Kaolinite

The paper describes an investigation of small-angle x-ray scattering as a possible technique for determining the particle size of clay minerals. The method used is that of Shull and Roess (Jour. Appl. (Phys. 18:295-307 (1947)) involving a graphical comparison of experimental scattering curves with theoretical curves. In theory, both the distribution of particle sizes and the shape of the particles should be obtainable, but in this study the particle shape was assumed. Descriptions of the method and of the two-crystal spectrometer used to collect the scattering data are included as well as data obtained for nineteen clay samples. (Author)

AD-630 393 Fld. 7/4
CFSTI Prices: HC $1.60 MF $0.50
INDIANA UNIV BLOOMINGTON
INELASTIC ELECTRON SCATTERING FROM ATOMS AND MOLECULES AT MEDIUM ENERGIES.
Final rept. 1962-65,
by Russell Bonham. 1965, 11p. Contract AF-AFOSR-602-64,
AFOSR 66-0605

Unclassified report

Descriptors: (*Electron diffraction analysis, Molecular structure), (*Atoms, Inelastic scattering), (*Molecular structure, Electron diffraction analysis), Spectrum analyzers, Gases, Electron bombardment, Chemical bonds, Hydrogen, Ammonia, Methane, Water vapor, Aromatic compounds

The purpose of the project was to make use of all the information that can be garnered from electron scattering from molecules to obtain detailed information about the structure of molecules. The design and construction of an electron spectrometer was undertaken. Various theoretical studies necessary for the proper interpretation of experimental results were also carried out. Achievements include the calculation of the effect of chemical binding on gas electron diffraction patterns and the experimental observation of this effect in the molecules H2, NH3, CH4 and H2O. New techniques were developed for the solution of the molecular and atomic integrals needed in the calculation of theoretical electron diffraction intensity curves for comparison with experiment. Partial wave elastic scattering factor calculations were carried out for a number of atoms and new least squares and auto correlation techniques were devised for the refined analysis of electron diffraction data in order to obtain precise molecular parameters. In addition the molecular structures of the compound C6C14H2, C6Br6, cycloheptatriene and perylene were carried out to test these newly developed techniques.

AD-630 400 Fld. 7/4, 20/4
AVCO EVERETT RESEARCH LAB EVERETT MASS
A BIMODAL APPROXIMATION FOR REACTING TURBULENT FLOWS: I. DESCRIPTION OF THE MODEL,
by Shao-Chi Lin. 20 Sep 65, 8p. Rept. no. AMP-184,
Contract AF 04 (394)-414 ,DA-19-020-AMC-0210

Unclassified report

Presented as Preprint 65-37 at the AIAA Aerospace Sciences Meeting (2nd), New York, Jan 25-27 1965.

Availability: Published in AIAA Journal v4 n2 p202-9 Feb 1966. Copies to DDC users only.

Descriptors: (*Turbulence, Reaction kinetics), (*Reaction kinetics, Turbulence), Approximation (Mathematics), Mathematical models, Fluid mechanics

An approximate method is proposed for calculating the rates of chemical reactions and of dissipation of mean-square fluctuations of chemical species in turbulent flowfields with large scale initial inhomogeneities under certain restrictive conditions. The method consists of dividing, in a statistical sense, any initially identifiable fluid element into two distinct volume fractions: a fraction psi, which survives the viscous dissipation or diffusive smearing process, and another fraction (1 - psi), which does not. The Lagrangian time history for the chemical reactions in the volume fraction psi is assumed to be identical to that in an inviscid stream-tube flow in spite of the convective distortions. The chemical reaction history for the remaining fraction (1 - psi) is to be determined by the reaction rates in a locally homogeneous mixture of all the neighboring fluid elements that have suffered diffusive smearing. The effects of turbulent transport of both the diffused and nondiffused fractions are represented by the same known function involving the initial coordinates of the fluid element. The spatial variation of psi is then determined by a competition between the local rate of production of inhomogeneity due to turbulent transport and the rate of depletion of inhomogeneity due to diffusive smearing. The simplifying assumptions required to render the problem determinate are briefly discussed. (Author)

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CFSTI Prices: HC $1.00 MF $0.50
HARVARD UNIV CAMBRIDGE MASS DIV OF ENGINEERING AND APPLIED PHYSICS
PRESSURE DEPENDENCE OF INTERSITIAL-SUBSTITUTIONAL DISSOCIATIVE DIFFUSION.
Technical rept.,
by T. R. Anthony, B. F. Dyson, and D. Turnbull. Jan 66, 11p. Contract SD-88,
ARPA 21

Unclassified report

Descriptors: (*Diffusion, Metals), Crystal lattice defects, Heat of activation, Silver, Gold, Lead, Solid solution, Pressure

The pressure dependence of the diffusivity of a solute existing in a substitutional-interstitial equilibrium is derived for the case where the interstitial solute's diffusion constant is much larger than its substitutional diffusion constant. The results, applied to the diffusivity of silver and gold in lead, show that these solutes dissolve almost completely interstitially in lead. (Author)

AD-630 458 Fld. 7/4, 11/6, 20/2
CFSTI Prices: HC $1.00 MF $0.50
HARVARD UNIV CAMBRIDGE MASS DIV OF ENGINEERING AND APPLIED PHYSICS
THE DIFFUSION OF GOLD AND SILVER IN TIN SINGLE CRYSTALS.
Technical rept.,
by Brian F. Dyson. Jan 66, 16p. Contract SD-88,
ARPA 22

Unclassified report

Descriptors: (*Diffusion, Metals), (*Gold, Diffusion), (*Silver, Diffusion), (*Tin, Single crystals), Heat of activation, Anisotropy, Crystal lattice defects, Solid solutions

The diffusivities D, of gold and silver in high purity tin have been measured along the 'C' and 'a' directions in the temperature range 135-225C. The results are characterized by a very large anisotropy of diffusion compared with that found for the self diffusion of tin. Furthermore, these solutes diffuse orders of magnitude faster than the self diffusion of tin and also they diffuse fastest along the 'c' direction, whereas tin diffuses fastest along the 'a' direction. This unusual behavior is interpreted as evidence that silver and gold dissolve interstitially in tin and diffuse by an interstitial mechanism.

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CFSTI Prices: HC $1.00 MF $0.50
HARVARD UNIV CAMBRIDGE MASS DIV OF ENGINEERING AND APPLIED PHYSICS
INTERSTITIAL DIFFUSION OF COPPER AND SILVER IN LEAD.
Technical rept.,
by B. F. Dyson, T. Anthony, and D. Turnbull. Dec 65, 23p. Contract SD-88,
ARPA 20

Unclassified report

Descriptors: (*Copper, Diffusion), (*Silver, Diffusion), (*Lead, Absorption (Physical)), Tracer studies

The diffusivities, D, of copper and silver in high purity lead have been measured by a radioactive tracer technique. The results, in combination with those of Seith and Keil and Ascoli et al., show that the rates of diffusion of the noble metals in lead are several orders of magnitude greater than the self diffusion rate of lead, D sub Pb. We have found that D sub Pb is not measurably affected by the dissolution of either gold, in agreement with Seith and Keil, or of copper. The results indicate that neither the vacancy, interstitialcy nor exchange mechanisms are predominant in the diffusion of these solutes. It is concluded that the noble metals are dissolved in lead at least partially in the interstitial state and that they diffuse almost wholly by an interstitial mechanism. (Author)

AD-630 461 Fld. 7/4, 20/13
CFSTI Prices: HC $7.00 MF $1.50
NATIONAL BUREAU OF STANDARDS WASHINGTON D C
TABLE OF THERMODYNAMIC PROPERTIES AND CHEMICAL COMPOSITION OF NITROGEN IN CHEMICAL EQUILLIBRIUM INCLUDING SECOND VIRIAL CORRECTIONS FROM 1600K TO 15,000K.
Technical rept.,
by Joseph Hilsenrath, and Max Klein. Apr 66, 309p.
AEDC 66-65

Unclassified report

AEDC-TDR-63-162 superseded.

Descriptors: (*Nitrogen, Thermodynamics), Chemical equilibrium, Dissociation, Ionization, Equations of state, Density, Enthalpy, Entropy, Tables

Tables for the thermodynamic properties for nitrogen are presented which take into account the effect of dissociation and ionization and the limiting-law Debye-Huckel and second virial corrections, upon the thermodynamic properties and the equilibrium compositions. Values are tabulated from 1600K in steps of 100K to 15,000K at close spacings in the logarithm of the density (log10 RHO/RHO-null = -7.0 (0.2)2.2) for the compressibility factor Z = PV/RT; the dimensionless functions for: internal energy, E/RT; enthalpy, H/RT; entropy, S/R; log10 P (atm) and Z* = Sigma (C sub i) and the mole fractions of the species in chemical equilibrium. The underlying equations and the input data are discussed briefly. The effects of the real gas corrections on the equilibrium properties are illustrated graphically. The equilibrium composition is given for selected temperatures over the tabulated density range. The wide range of temper-

atures and densities over which the thermodynamic properties have been tabulated make the tables useful in a variety of engineering design and test programs, and in scientific research and development. (Author)

AD-630 467 Fld. 7/4, 11/6, 20/13
CFSTI Prices: HC $1.00 MF $0.50
ARMY MATERIALS RESEARCH AGENCY WATERTOWN MASS MATERIALS RESEARCH DIV
HIGH-TEMPERATURE EQUILIBRIUM IN THE GERMANIUM NICKEL SYSTEM AND THE DISSOCIATION ENERGY OF GENI.
Technical rept.,
by Arthur Kant. Dec 65, 21p. Proj. D/A-1C04501B13A
AMRA TR-65-33
Unclassified report

Descriptors: (*Diatomic molecules, Thermochemistry), (*Thermochemistry, Germanium alloys), (*Germanium alloys, Nickel alloys), Dissociation, Energy, Vapors, Thermodynamics, Chemical equilibrium, High-temperature research, Enthaly, Heat of formation, Chemical reactions, Mass spectroscopy

The GeNi molecule has been shown to exist in the vapor phase over liquid solutions of germanium and nickel above 2000 K. Using information derived from a combination of effusion and mass spectrometric techniques, the energies and equilibrium constants of the gaseous reactions GeNi + Ge = Ge2 + Ni and GeNi = Ge + Ni have been calculated. The values of the energy assuming a singlet sigma ground state of GeNi are GeNi + Ge = Ge2 + Ni delta internal energy = 1.6 plus or minus 4 kcal and GeNi = Ge + Ni dissociation energy (GeNi) = 66.4 plus or minus 4 kcal. The dissociation energy of Ge2 was also determined and the value of 64.9 plus or minus 3 kcal confirms results obtained previously. (Author)

AD-630 495 Fld. 7/4, 20/6
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
ELECTRONIC SPECTRA OF SOLUTIONS OF EUROPIUM AND YTTERBIUM IN LIQUID AMMONIA,
by D. S. Thompson, D. W. Schaefer, and J. S. Waugh. 21 Sep 65, 2p. Contract DA-36-039-AMC-03200 (E)
Unclassified report

Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.

Availability: Published in Inorganic Chemistry v5 p325-6 1966. Copies to DDC users only.

Descriptors: (*Europium, Absorption spectrum), (*Ytterbium, Absorption spectrum), Ammonia, Liquefied gases, Solutions, Paramagnetic resonance, Ground state, Electron spin resonance, Spectra (Visible + ultraviolet)

AD-630 498 Fld. 7/4, 20/13
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
TEMPERATURE AND PRESSURE DEPENDENCE OF SELF-DIFFUSION IN LIQUID ETHANE,
by C. G. Wade, and J. S. Waugh. 22 Jul 65, 3p. Contract DA-36-039-AMC-03200 (E)
Unclassified report

Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.

Availability: Published in The Journal of Chemical Physics v43 n10 p3555-7 Nov 15 1965. Copies to DDC users only.

Descriptors: (*Alkanes, Diffusion), Temperature, Pressure, Nuclear magnetic resonance, Equations of state, Liquefied gases

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AD-630 499 Fld. 7/4, 7/2
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
LONG-WAVE INFRARED SPECTRA OF ALKALI SALTS OF PLATINUM HALIDE COMPLEXES.
Revised ed.,
by J. H. Fertel, and C. H. Perry. 30 Apr 65, 7p. Contract DA-36-039-AMC-03200 (E) ,NSF-G19637
Unclassified report

Revision of manuscript submitted 11Jan 65.

Availability: Published in The Journal of Physics and Chemistry of Solids v26 p1773-8 1965. Copies to DDC users only.

Descriptors: (*Spectra (Infrared), Complex compounds), (*Complex compounds, Spectra (Infrared)), Inorganic compounds, Alkali metal compounds, Salts, Platinum compounds, Halides, Crystal lattices, Vibration, Chemical bonds, Absorption spectrum, Raman spectroscopy

The absorption spectra of a number of alkali salts of platinum metal halide complexes were investigated using a vacuum far-infrared spectrometer. Lattice vibrations and the stretching and bending frequencies of the metal -halogen bonds were observed in the range 40-360/cm. The compounds, which are of the type R2XY4 (square planar anion), were examined both at room temperature and at liquid nitrogen temperature. The assignment of the normal modes were made and the force constants of the vibrational motions have been calculated using a valence force field model. (Author)

AD-630 501 Fld. 7/4
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
SIMPLE CLASSICAL MODEL FOR THE SCATTERING OF GAS ATOMS FROM A SOLID SURFACE,
by R. M. Logan, and R. E. Stickney. 5 Aug 65, 7p. Contract DA-36-039-AMC-03200 (E)
Unclassified report

Availability: Published in The Journal of Chemical Physics v44 n1 p195-201 Jan 1 1966. Copies to DDC users only.

Descriptors: (*Molecular beams, Scattering), Atoms, Gases, Solids, Surfaces, Theory, Potential theory, Distribution functions

A simple classical model for the scattering of gas atoms from a solid surface is proposed and its characteristics are determined. The principal assumptions are (1) the interaction of a gas atom with a surface atom is represented by an impulsive force of repulsion, (2) the gas-surface intermolecular potential is uniform in the plane of the surface (hence the interaction does not change the tangential velocity of the gas particle), (3) the surface atoms are represented by independent particles confined by square-well potentials, (4) the surface atoms have a Maxwellian velocity distribution. The model incorporates many of the same features as that proposed by Goodman. As a result of these assumptions, the model is simplified to the extent that it contains no adjustable constants. Results are obtained for the angular distribution of the scattered particles. Significant quantative results are not expected from such a simple model, but the qualitative behavior of the model does agree surprisingly well with the experimental results. The model correctly predicts the general appearance of the scattering pattern and its dependence on the angle of incidence of the beam and on the temperatures and masses of the gas and surface atoms. It is concluded that, contrary to the assumption often made in theoretical studies of gas-surface interactions, the temperature of the surface is a significant parameter when considering the existing experimental data. (Author)

AD-630 505 Fld. 7/4
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA
FORMATION OF H (-) BY ELECTRON IMPACT ON H2 AT LOW ENERGY,
by G. J. Schulz, and R. K. Asundi. 15 Nov 65, 3p.
Unclassified report

Prepared in cooperation with Advanced Research Projects Agency through the U. S. Office of Naval Research.

Availability: Published in Physical Review Letters v15 n25 p946-8 20 Dec 1965. Copies to DDC users only.

Descriptors: (*Hydrogen, Electron bombardment), Ions, Dissociation, Probability, Isotopes

A report is made of the formation of the atomic-hydrogen negative ion by electron impact on H2 very close to the theoretical threshold for the production of H (-) and H with zero kinetic energy, via the process e + H2 to H (-) + H. It is found that H (-) formation has a very sharp onset at an electron energy of 3.73 plus or minus 0.07 eV and a very steeply rising, albeit small, cross section which peaks very close to its onset. This observation leads to a better understanding of the potential energy curves of the H2 (-) system and has a bearing on the interpretation of vibrational excitation in H2. (Author)

AD-629 776 See Fld. 11/2

AD-629 899 See Fld. 11/4

AD-629 924 See Fld. 20/9

AD-629 958 See Fld. 14/2

AD-629 991 See Fld. 1/9

AD-629 999 See Fld. 4/2

AD-630 019 See Fld. 11/9

AD-630 035 See Fld. 20/10

AD-630 044 See Fld. 7/1

AD-630 067 See Fld. 14/2

AD-630 086 See Fld. 7/2

AD-630 105 See Fld. 7/2

AD-630 106 See Fld. 7/2

AD-630 107 See Fld. 7/2

AD-630 108 See Fld. 7/2

AD-630 109 See Fld. 7/2

AD-630 216 See Fld. 20/6

AD-630 270 See Fld. 20/4

AD-630 412 See Fld. 11/6

AD-630 455 See Fld. 20/5

AD-630 456 See Fld. 20/10

7/5. RADIO AND RADIATION CHEMISTRY

AD-629 803 Fld. 7/5
PITTSBURGH UNIV PA DEPT OF CHEMISTRY
PHOSPHONIC ACIDS AND ESTERS. XI. A PHOTO -INDUCED ARBUZOV REARRANGEMENT OF TRIALKYL PHOSPHITES,
by R. B. LaCount, and C. E. Griffin. 1 Jul 65, 6p. Contract AF-AFOSR-470-64, AFOSR 65-2135

Unclassified report

Availability: Published in Tetrahedron Letters n35 p3071-4 1965. Copies to DDC users only.

Descriptors: (*Phosphites, Photochemistry), (*Organic phosphorus compounds, Photochemistry), Phosphonic acids, Esters, Chemical reactions, Free radicals

Photolysis of trimethyl, triethyl, tri-i-propyl, and tri-n-butyl phosphites yielded the corresponding dialkyl alkylphosphonates as the major product, indicating the reaction is effectively an example of photoinitiation of the Arbuzov rearrangement.

AD-629 833 Fld. 7/5, 7/3
OHIO STATE UNIV COLUMBUS DEPT OF CHEMISTRY
PHOTOCHEMICAL TRANSFORMATIONS OF A BETA,GAMMA-EPOXY KETONE,
by Albert Padwa. 23 Jun 65, 5p. Contract AF-AFOSR-820-65, AFOSR 66-0296

Unclassified report

Availability: Published in Journal of the American Chemical Society v87 n18 p4205-6 Sep 20 1965. Copies to DDC users only.

Descriptors: (*Ketones, Photochemistry), (*O-heterocyclic compounds, Photochemistry), (*Photochemistry, Ketones), Molecular isomerism, Monocyclic compounds, Alcohols, Butanones

In contrast to the exhaustive studies reported in the literature concerning the photochemistry of alpha,betaepoxy ketones there has been no attempt, to date, to examine the phototransformations of the related alpha,gamma-acyl oxide system. It is demonstrated that, although a formally analogous rearrangement occurs, the mechanism of the transformation is markedly different.

AD-629 834 Fld. 7/5, 7/3
OHIO STATE UNIV COLUMBUS DEPT OF CHEMISTRY
PHOTOLYTIC DESULPHURIZATION OF DIBENZOYLSTILBENE EPISULPHIDE,
by Albert Padwa, and David Crumrine. 6 Sep 65, 5p. Contract AF-AFOSR-820-65, AFOSR 66-0297

Unclassified report

Availability: Published in Chemical Communications n21 p506-7 Nov 10 1965. Copies to DDC users only.

Descriptors: (*S-heterocyclic compounds, Photolysis), (*Photochemistry, S-heterocyclic compounds), Ultraviolet radiation, Molecular isomerism, Stereochemistry, Molecular energy levels, Alkenes, Benzenes

A description is given of the photo-extrusion of sulphur from dibenzoylstilbene episulphide (I) by ultraviolet light filtered through Pyrex glass. Irradiation of (I) afforded a mixture of cis- and trans-dibenzoylstilbene (II and III) in high yield. The photodesulphurization is markedly stereospecific. Consideration of the isomeric distribution of the olefin obtained in a number of photolyses and the irradiation time demonstrated at least 90% stereoselective removal of sulphur from (I) to give (III). The loss of sulphur from the episulphide upon photolysis is most simply explained by assuming a cleavage of the C (alpha)-S bond of the three-membered ring followed by loss of atomic sulphur. (Extracted)

AD-629 835 Fld. 7/5, 7/3
OHIO STATE UNIV COLUMBUS DEPT OF CHEMISTRY
THE PHOTOCHEMICAL DECOMPOSITION OF ALPHA-DIAZOACETOPHENONE IN HYDROXYLIC SOLVENTS,
by Albert Padwa. 5 May 65, 6p. Contract AF-AFOSR-820-65, AFOSR 66-0298

Unclassified report

Availability: Published in Tetrahedron Letters n26 p2167-70 1965. Copies to DDC users only.

Descriptors: (*Acetophenones, Photolysis), (*Organic nitrogen compounds, Photolysis), (*Photolysis, Molecular energy levels), Solvents, Alcohols, Chemical reactions, Ultraviolet radiation, Excitation

The photolysis of alpha-diazoacetophenone in polar solvents is known to afford products derived from rearrangement of the carbon skeleton. Evidence is now presented which demonstrates conclusively that the singlet state is the reactive intermediate in the Wolff rearrangement.

AD-629 886 Fld. 7/5
CFSTI Prices: HC $2.60 MF $0.50
MONSANTO RESEARCH CORP EVERETT MASS BOSTON LAB
CHEMILUMINESCENT SYSTEMS.
echnical rept. no. 7, 1 Dec 65-28 Feb 66, by John S. Driscoll, and Joseph A. Pirog. 15 Mar 66, 21p. Rept. no. MRB-3009Q7, Contract Nonr-4511 (00),ARPA Order-299 Proj. NR-356-464,

Unclassified report

See also AD-626 937.

Descriptors: (*Chemiluminescence, Catalysis), (*Catalysis, Chemiluminescence), (*Indoles, Chemiluminescence), Laboratory equipment, Catalysis, Platinum, Palladium, Silver, Charcoal, Silicon compounds, Aluminum compounds, Oxides, Dyes, Organic sulfur compounds, Potassium compounds, Oxygen, Light, Emissivity

An apparatus was constructed for the study of the heterogeneous catalysis of chemiluminescent systems. Metals (Pt, Pd, Ag) and supports (charcoal, silica, alumina) were investigated as catalysts for luminol, lophine and skatole in the DMSO, t-BuOK, O2 system. Enhancement of light emission has not, thus far, been observed. The addition of a sensitizing agent (fluorescein) to the heterogeneous systems increased the light output relative to the unsensitized systems. (Author)

AD-629 900 Fld. 7/5
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
PARAMAGNETIC CENTERS IN IRRADIATED POTASSIUM SULFATE,
by V. V. Gromov, and J. R. Morton. 14 Oct 65, 3p.
NRC 8807

Unclassified report

Availability: Published in Canadian Journal of Chemistry v44 p527-8 1966. Copies to DDC users only.

Descriptors: (*Sulfates, Radiation chemistry), (*Potassium compounds, Sulfates), Electron spin resonance, Single crystals, Paramagnetic materials, Hyperfine structure, Anisotropy, Isotropism, Canada

Recent investigations into the radiolysis of polycrystalline sulfates prompted this examination of the electron spin resonance (e.s.r.) spectra of irradiated potassium sulfate single crystals. By irradiating the samples and studying their spectra at 77K and at 300K, different stages in the radiation damage process were revealed. The e.s.r. spectra of single crystals of K2SO4 irradiated and examined at 77K demonstrated the presence of a single paramagnetic species, A, characterized by a highly anisotropic g-tensor. By monitoring the spectrum during warm-up of the sample it could be seen that over 90% of A decomposed to form a second species, B, although the amount of A surviving at 300K was sufficient to permit the determination of its g-tensor at this temperature. The radical B was characterized by an almost isotropic g-tensor.

AD-630 072 Fld. 7/5, 7/3
TULANE UNIV NEW ORLEANS LA DEPT OF CHEMISTRY
PHOTOCYCLIZATION OF 3,3-DIMETHYL-1-PHENYLBUTENE-1. A NOVEL PHOTOINDUCED 1,2-METHYL MIGRATION,
by H. Kristinsson, and G. W. Griffin. 25 Oct 65, 2p. Contract DA-31-124-ARO (D)-182 ,NSF-GP-3674
AROD 4375:8

Unclassified report

Availability: Published in Journal of the American Chemical Society v88 n2 p378-9 Jan 20 1966. Copies to DDC users only.

Descriptors: (*Monocyclic compounds, Photochemistry), (*Cyclopropanes, Synthesis (Chemistry)), Alkenes, Chemical reactions, Aromatic compounds

An equilibrium mixture of cis- and trans-3,3-dimethyl1-phenylbutene-1 (I) was prepared by condensation of trimethyl acetaldehyde with the ylid prepared from benzyl triphenyl phosphonium and phenyl lithium. Irradiation of I afforded 2,3-dimethyl- 4-phenylbutene-1 (III), and available evidence indicates that cis- and trans-2,2,3trimethyl- 1-phenylcyclopropanes (II) are intermediates in the photoreaction. The latter compounds were also prepared by irradiating stilbene oxide in 2-methyl-2butene. The possible mechanism of the conversion of I to III through II, involving methyl migration accompanying cyclization, is discussed.

AD-630 227 Fld. 7/5, 20/8
NEW SOUTH WALES UNIV KENSINGTON (AUSTRALIA) DEPT OF NUCLEAR AND RADIATION CHEMISTRY
POSITRON LIFETIMES IN NEUTRON- AND GAMMA -IRRADIATED POLYMERS,
by J. H. Green, and S. J. Tao. 8 Feb 65, 7p. Contract AF-AFOSR-62-398,

Unclassified report

Availability: Published in British Journal of Applied Physics v16 p981-4 1965. Copies to DDC users only.

Descriptors: (*Positrons, Polymers), (*Polymers, Radiation damage), (*Annihilation reactions, Positrons), Halocarbon plastics, Polyethylene plastics, Positronium, Life expectancy, Gamma rays, Neutrons, Radiation chemistry, Australia

Positron lifetimes in neutron- and gamma-irradiated solid polymers of the degrading and cross-linking type, polytetrafluoroethylene (PTFE) and polyethylene, were measured. Variations in lifetimes and intensities of the short and long components of the longer positronium lifetime are qualitative indicators of the degree of crystallinity and free radical production in the polymers. In polyethylene tau sub 2 decreases rapidly as cross-linking increases with small doses, especially of neutrons; I sub 3 decreases quite slowly as the solid becomes more amorphous. In PTFE, radical production following chain scission leads to a rapid decrease in I sub 3 due to conversion of positronium and an increase in the ratio I sub 2/ (I sub 2 + I sub 3) indicates increasing crystallinity. (Author)

AD-630 228 Fld. 7/5, 20/8
NEW SOUTH WALES UNIV KENSINGTON (AUSTRALIA) DEPT OF NUCLEAR AND RADIATION CHEMISTRY
POSITRONIUM AND ITS CHEMISTRY,
by J. H. Green. 1965. 8p. Contract AF-AFOSR-62-398,
AFOSR 66-0278
Unclassified report

Availability: Published in Proceedings, The Royal Australian Chemical Institute p7-12 Jan 1965. Copies to DDC users only.

Descriptors: (*Positronium, Chemistry), Chemical properties, Chemical reactions, Atomic energy levels, Theory, Test methods, Annihilation reactions, Australia

AD-630 044 See Fld. 7/1

AD-630 086 See Fld. 7/2

AD-630 105 See Fld. 7/2

AD-630 106 See Fld. 7/2

AD-630 107 See Fld. 7/2

AD-630 108 See Fld. 7/2

AD-630 109 See Fld. 7/2

AD-630 211 See Fld. 7/4

AD-630 302 See Fld. 18/2

Field 8-EARTH SCIENCES AND OCEANOGRAPHY

8/1. BIOLOGICAL OCEANOGRAPHY

AD-629 963 See Fld. 6/3

8/2. CARTOGRAPHY

AD-630 405 Fld. 8/2, 14/5, 8/10, 5/6
GENERAL DYNAMICS CORP GROTON CONN ELECTRIC BOAT DIV
STEREO-MAPPING OF UNDERWATER TERRAIN FROM A SUBMARINE,
by Rudolf Karius, Paul M. Merifield, and Donald M.Rosencrantz. 1965. 11p.
Unclassified report

Prepared in cooperation with Earth Science Research Corp., Malibu, Calif.

Availability: Published in Ocean Science and Ocean Engineering, Transactions of Joint Conference, Marine Technology Society and American Society of Limnology and Oceanography, Washington, D. C. p1167-77 June 1965. Copies to DDC users only.

Descriptors: (*Stereoscopic photography, Photogrammetry), (*Photogrammetry, Ocean bottom topography), (*Ocean bottom topography, Photogrammetry), (*Underwater photography, Photogrammetry), Submarines, Underwater cameras, Mapping, Archeology, Ships, Ocean bottom

Using deep-sea cameras mounted on a small two-man submarine, a large section of a fourth century Roman shipwreck was successfully mapped using stereophotogrammetric techniques. The submarine 'flew' over the wreck in a manner similar to that used in aerial survey techniques and took a series of photographs which were analyzed in conventional stereographic plotting instruments. The result was a planimetric map with object heights for an area of six by twelve meters. Modified aerial cameras were used in pressure-proofed housings fitted with distortion correcting portholes. The submarine used was particularly well suited to the application because of its high stability and outstanding maneuverability at low speeds. Aerial film was used underwater because of its high contrast characteristics. The extension of the techniques to a synchronous two-camera system is also discussed. (Author)

8/3. DYNAMIC OCEANOGRAPHY

AD-629 802 Fld. 8/3
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATHEMATICS
A NECESSARY CONDITION FOR THE EXISTENCE OF AN INERTIAL BOUNDARY LAYER IN A BAROCLINIC OCEAN,
by Joseph Pedlosky. 18 Mar 65, 6p. Contract AF-AFOSR-492-64, Proj. AF-9749, Task 974901,
AFOSR 65-2324
Unclassified report

Availability: Published in Journal of Marine Research v23 n2 p69-72 1965. Copies to DDC users only.

Descriptors: (*Ocean currents, Boundary layer), Ocean bottom topography, Fluid mechanics, Oceanology

A criterion for the existence of an inertial boundary current in a baroclinic ocean is derived. It is shown that the effect of topographical variations can play a decisive role in determining whether an inertial boundary current can exist, even if the velocity field is highly baroclinic. (Author)

AD-630 431 Fld. 8/3, 4/2, 20/4
CFSTI Prices:MF $0.50
NAVAL OCEANOGRAPHIC OFFICE WASHINGTON D C
WAVE HINDCAST PROJECT NORTH ATLANTIC OCEAN.
Technical rept. (Final),
by Donald C. Bunting. Jan 66, 43p. Rept. no. TR-183,
Unclassified report

Availability: Hardcopy available from Naval Oceanographic Office, Washington, D. C. $0.75.

Descriptors: (*Ocean waves, Atlantic Ocean), (*Atlantic Ocean, Ocean waves), (*Climatology, Atlantic Ocean), Hydrodynamics, Water waves, Oceanographic data, Graphics, Marine meteorology, Data processing systems

A computerized system has been developed for the production of ocean wave spectra over the North Atlantic Ocean. The spectra results are fairly close to observed conditions. By means of this system a 15-month series of wave spectra has been obtained at 519 gridpoints over the North Atlantic. Each spectrum is described in terms of the spectral energy in 12 directions for 15 different frequencies. (Author)

AD-629 857 See Fld. 8/11

8/5. GEODESY

AD-629 982 Fld. 8/5, 14/2
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
COMPARISON OF LACOSTE-ROMBERG AND ASKANIA-GRAF GRAVITY METERS IN GIMBAL AND STABILIZED MOUNTS.
Instrumentation papers (revised ed.),
by Lloyd G. D. Thompson. 27 Jul 65, 19p. Rept. no. AFCRL-IP-87,AFCRL-66-3
Proj. AF-7600, Task 760002,
Unclassified report

Revision of manuscript submitted 25 Feb 65.

Availability: Published in Journal of Geophysical Research v70 n22 p5599-5613 Nov 15 1965. Copies to DDC users only.

Descriptors: (*Gravity, Measurement), Airborne, Stabilized platforms, Gimbals, Meters, Geodesics

On the basis of results that are considered to be the most reliable and to represent the capabilities of the gravity meters in each configuration tested, a comparison of observed gravity values with an upward-continued value computed from surface gravity measurements showed that (1) for the Askania-Graf on a stabilized mount the mean gravity value for 29 flights agreed within 1 mgal with the computed value and the rms deviation for a single observation was 7.2 mgal, (2) for the LaCoste-Romberg on a stabilized mount the mean gravity value for 10 flights agreed within 1 mgal with the computed value and the rms deviation was 7.3 mgal, and (3) for the LaCoste-Romberg in a gimbal suspension the mean gravity value (corrected for a 5-mgal horizontal acceleration correction error) for 24 flights agreed within 1 mgal with the computed value and the rms deviation was 8.5 mgal. Of the two techniques tested, the stabilized platform technique proved to be more advantageous, having a simpler operating procedure and needing less maintenance. (Author)

AD-629 820 See Fld. 20/10

AD-630 231 See Fld. 20/10

AD-630 311 See Fld. 20/10

AD-630 410 See Fld. 14/2

8/6. GEOGRAPHY

AD-630 027 Fld. 8/6, 6/3
LOUISIANA STATE UNIV BATON ROUGE COASTAL STUDIES INST
GEOGRAPHIC RECONNAISSANCE OF WESTERN AUSTRALIAN SEASHORE VEGETATION.
Technical rept. on Australian Coastal Studies,
by Jonathan D. Sauer. 26 Oct 64, 37p. Rept. no. TR-26-Pt-A,Contrib-65-5
Contract Nonr-1575 (03), Proj. NR-388-002,
Unclassified report

Prepared in cooperation with Wisconsin Univ, Madison.

Availability: Published in Australian Journal of Botany v13 n1 p39-69 June 1965. Copies to DDC users only.

Descriptors: (*Australia, Plants (Botany)), (*Plants (Botany), Australia), (*Geography, Australia), Seacoast, Ecology

AD-630 028 Fld. 8/6, 6/3
LOUISIANA STATE UNIV BATON ROUGE COASTAL STUDIES INST
NOTES ON SEASHORE VEGETATION OF KENYA.
Technical rept. on Indian Ocean Studies,
by Johathan Sauer. 1 Dec 65, 8p. Rept. no. TR-15-Pt-H,Contrib-65-7
Contract Nonr-1575 (03), Proj. NR-388-002,
Unclassified report

Prepared in cooperation with Wisconsin Univ., Madison.

Availability: Published in Annals of Missouri Botanical Garden v52 n3 p438-43 1965. Copies to DDC users only.

Descriptors: (*Kenya, Plants (Botany)), (*Plants (Botany), Kenya), (*Geography, Kenya), Seacoast, Ecology

AD-630 327 See Fld. 8/8

8/7. GEOLOGY AND MINERALOGY

AD-630 023 Fld. 8/7
LOUISIANA STATE UNIV BATON ROUGE COASTAL STUDIES INST
MASS-MOVEMENT IN CONTRASTING LATITUDES.
Technical rept.,
by Richard J. Russell. 15 Sep 65, 15p. Rept. no. TR-25,Contrib-65-4
Contract Nonr-1575 (03), Proj. NR-388-002,
Unclassified report

Availability: Published in International Congress on Quaternary (6th), p143-52 Warsaw 1961. Copies to DDC users only.

Descriptors: (*Erosion, Mountains), (*Mountains, Erosion), Geology

Instances of mass-movement are described from Novaya Zemlya, Brazil, Martinique, Louisiana, and the Lower Mississippi Valley. Results of these solifluctional activities have been misinterpreted in various ways. For the reason that mass-movements of surficial materials are so widespread, caution is needed in regarding them as evidence of periglacial activities. (Author)

AD-630 111 Fld. 8/7, 8/13, 8/11
CFSTI Prices: HC $4.00 MF $1.00
COLUMBIA UNIV NEW YORK
QUICK CLAY MOVEMENTS, ANCHORAGE, ALASKA.
Preliminary rept.,
by Paul F. Kerr, and Isabella M. Drew. Dec 65, 139p. Rept. no. Scientific-5,
Contract AF 19 (604)-8387, Proj. AF-8623, Task 862302,
AFCRL 66-78
Unclassified report

Descriptors: (*Avalanches, Clay), (*Clay, Avalanches), (*Alaska, Engineering geology), Earthquakes, Clay minerals, Soil mechanics, Stratigraphy, Structural geology

The earthquake on March 27, 1964, at Anchorage, Alaska (Pl. 1) caused major destruction and loss of life. Within the city of Anchorage and nearby, major damage resulted from earthquake vibration. However, greatly intensified destruction was brought about by landslides or sinking land. Preliminary accounts suggested the possibility that movements in sensitive clay masses widely distributed in underlying strata were responsible for much of the Anchorage deformation. This paper describes observations on the Anchorage clay, the earth movements which followed the earthquake, and nearby slides of earlier and perhaps similar origin.

AD-630 155 Fld. 8/7, 8/10
SCRIPPS INSTITUTION OF OCEANOGRAPHY UNIV OF CALIFORNIA LA JOLLA
DISTRIBUTION OF DETRITAL MINERALS IN RECENT CARBONATE SEDIMENTS FROM THE SAHUL SHELF, NORTHERN AUSTRALIA,
by C. C. von der Borch. 13 Apr 65, 9p. Contract Nonr-2216 (23), Proj. NR-083-005,
Unclassified report

Supported in part by NSF.

Availability: Published in Journal of the Geological Society of Australia v12 pt2 p333-9 1965. Copies to DDC users only.

Descriptors: (*Australia, Marine geology), (*Marine geology, Australia), (*Minerals, Marine geology), Economic geology, Sedimentation, Ocean bottom sampling, Carbonate minerals

Detrital minerals in Recent sediments from the Sahul Shelf show a well-defined distribution pattern which can be related to nearby river estuaries. Two major contrasting heavy mineral provinces are evident, characterized in turn by an unstable and a stable suite of minerals. A zone of relatively high feldspar content coincides with the unstable heavy mineral province. The source of the detrital grains is considered to the dissected lateritic hinterland, and the depth of dissection in any area may determine whether stable or unstable minerals are supplied to the ocean. (Author)

AD-629 770 See Fld. 20/2

AD-629 822 See Fld. 8/11

AD-629 857 See Fld. 8/11

AD-629 971 See Fld. 8/11

AD-629 974 See Fld. 8/11

AD-629 978 See Fld. 8/10

AD-629 997 See Fld. 8/10

AD-630 082 See Fld. 8/10

AD-630 370 See Fld. 7/4

AD-630 404 See Fld. 8/11

8/8. HYDROLOGY AND LIMNOLOGY

AD-630 031 Fld. 8/8
LOUISIANA STATE UNIV BATON ROUGE COASTAL STUDIES INST
SEDIMENTARY STRUCTURES: MISSISSIPPI RIVER DELTAIC PLAIN.
Technical rept. on United States Gulf Coastal Studies,
by James M. Coleman, and Sherwood M. Gagliano. 10 Dec 65, 31p. Rept. no. TR-16-Pt-H,Contrib-65-8
Contract Nonr-1575 (03), Proj. NR-388 002,
Unclassified report

Availability: Published in Primary Sedimentary structures and their Hydrodynamic Interpretation p133-48 1965. Copies to DDC users only.

Descriptors: (*Deltas, Louisiana), (*Sedimentation, Louisiana), (*Rivers, Sedimentation), Hydrology, Marine geology, Seacoast

Minor sedimentary structures were studied in cores and exposures in the deltaic and marginal deltaic plains of the Mississippi River. Selected active environments were sampled and the occurrence of sedimentary structures from each was recorded. Twenty-five individual structure types are illustrated and described with notations on processes responsible for their formation. Individual structures were found to occur in more than one environment, however, suites of structures were characteristic. Within the study area the following 12 depositional environments have been investigated: shelf, prodelta, delta front (distal bar, distributary mouth bar, distributary channel, and subaqueous levee), subaerial levee, marsh, swamp, interdistributary bay, mudflat, and fresh water lake. Within each environment, individual structures tell of one or several events, while the total assemblage of structures approximates many of the conditions active during deposition. (Author)

AD-630 327 Fld. 8/8, 8/6
CFSTI Prices: HC $1.00 MF $0.50
DEPARTMENT OF THE NAVY WASHINGTON D C
ENERGY OF THE SIBERIAN RIVERS AND THE NORTHERN SEA ROUTE,
by V. S. Antonov. 1966, 20p. Rept. no. Translation-979,
TT 66-60823
Unclassified report

Energiya Sibirskikh Rek i Severnyi Morskoi Put, trans. of Priroda (USSR) n6 p25-33 1963.

Descriptors: (*Siberia, Rivers), (*Rivers, Siberia), Economy, Water traffic, Geography, Hydrology, Arctic Ocean, USSR

8/10. PHYSICAL OCEANOGRAPHY

AD-629 978 Fld. 8/10, 8/7
CFSTI Prices: HC $2.00 MF $0.50
ARMY COASTAL ENGINEERING RESEARCH CENTER WASHINGTON D C
INTERAGENCY CONFERENCE ON CONTINENTAL SHELF RESEARCH,
by Norman E. Taney, and Richard H. Allen. Jan 66, 41p. Rept. no. Miscellaneous paper-1-66,
Unclassified report

Descriptors: (*Marine geology, Research program administration), United States Government, Scientific research, Symposia, Seacoast, Ocean bottom topography, Oceanology

Proceedings of an Interagency Conference on Continental Shelf Research, held at the Coastal Engineering Research Center on 13 May 1965, are presented. The contributions describe the magnitude and direction of Continental Shelf research being conducted by the various interested Federal agencies. (Author)

AD-629 997 Fld. 8/10, 8/7
SCRIPPS INSTITUTION OF OCEANOGRAPHY UNIV OF CALIFORNIA LA JOLLA
FRACTURE ZONES AND OFFSETS OF THE EAST PACIFIC RISE,
by H. W. Menard. 3 Aug 65, 5p. Contract Nonr-2216 (12),NSF-GP-3140 Proj. NR-083 005,
Unclassified report

Prepared in cooperation with Institute of Marine Resources, Univ. of California, La Jolla.

Availability: Published in Journal of Geophysical Research v71 n2 p682-5 Jan 15 1966. Copies to DDC users only.

Descriptors: (*Pacific Ocean, Ocean bottom topography), (*Marine geology, Pacific Ocean), Structural geology, Seismology

AD-630 082 Fld. 8/10, 8/7
CORNELL UNIV ITHACA N Y
THE EXPLANATORY DESCRIPTION OF COASTS.
Technical rept.,
by Arthur L. Bloom. 15 Dec 65, 16p. Rept. no. TR-4,
Contract Nonr-401 (45) Proj. NR-388-065,
Unclassified report

Availability: Published in Zeitschrift fur Geomorphologie v9 n4 p422-36 1965. Copies to DDC users only.

Descriptors: (*Seacoast, Marine geology), (*Marine geology, Seacoast), (*Beaches, Marine geology), Erosion, Sedimentation, Terrain, Dynamics

An explanatory-descriptive scheme of coastel morphology involves the variables of: (1) erosion and deposition, (2) submergence and emergence, and (3) time. These variables may be represented by three mutually perpendicular axes, with emergence and deposition as the positive directions on two axes, in opposition to submergence and erosion as the negative directions, and time as the third axis. Previous explanatory-descriptive schemes and coastel classifications can be shown to be special cases of a general system, which are best illustrated by unique planes or lines in a three-dimensional coordinate framework.

AD-630 154 Fld. 8/10
SCRIPPS INSTITUTION OF OCEANOGRAPHY UNIV OF CALIFORNIA LA JOLLA
NITRITE DISTRIBUTION IN PERU CURRENT WATERS,
by Warren S. Wooster, Tsaihwa J. Chow, and Izadore Barrett. 10 Aug 65, 15p. Contract Nonr-2216 (23), Proj. NR-083 005,
Unclassified report

Supported in part by NSF. Prepared in cooperation with Inter-American Tropical Tuna Commission, La Jolla, Calif.

Availability: Published in Journal of Marine Research v23 n3 p210-21 1965. Copies to DDC users only.

Descriptors: (*Nitrites, Peru), (*Pacific Ocean, Nitrites), (*Peru, Nitrites), South America, Seacoast, Sea water, Organic nitrogen compounds, Oceanographic data

Studies of the nitrite-nitrogen distribution off the western coast of South America have shown significant concentrations in surface waters (up to 0.5 microgramat/l) and a widespread primary maximum near the top of the thermocline. Below the surface layer, where the oxygen minimum contains less than 0.2 ml/l of dissolved oxygen, a secondary maximum was present south of 10 degrees S, within 1000 km of the coast. Concentrations greater than 3 micrograms at/l were observed at nine stations. The secondary maximum was associated with rather narrow limits of specific volume, but the vertical samples were too far apart to permit an adequate description of this maximum. The highest concentrations tended to occur off southern Peru and northern Chile and were closely related to the salinity maximum of the Peru-Chile Undercurrent. (Author)

AD-630 122 See Fld. 8/12

AD-630 155 See Fld. 8/7

AD-630 405 See Fld. 8/2

8/11. SEISMOLOGY

AD-629 822 Fld. 8/11, 8/7
CALIFORNIA UNIV LOS ANGELES INST OF GEOPHYSICS AND PLANETARY PHYSICS
FIRST MOTIONS FROM SEISMIC SOURCES NEAR A FREE SURFACE,
by R. Burridge, E. R. Lapwood, and L. Knopoff. 14 Aug 64, 25p. Contract AF-AFOSR-710-64, AFOSR 65-2132
Unclassified report

Availability: Published in Bulletin of the Seismological Society of America v54 n6 p1889-1913 Dec 1964. Copies to DDC users only.

Descriptors: (*Seismology, Structural geology), (*Structural geology, Seismology), Faults (Geology), Seismic waves

The radiation patterns of first motions are calculated for the sudden occurrence of an arbitrarily oriented fault (dislocation) at the surface of a half space; the dislocation in the fault plane is also arbitrarily oriented and is assumed to occur over a very small area of the fault plane. Initially the source is considered at a finite depth and the solution is obtained by allowing the depth to tend to zero. In general the results show a surprising directionality for the radiation of SV. In the focal plane projection the first motions of P and SH for a strike-slip fault show the familiar four-lobed radiation patterns. The first motions of SV show some reversals in polarity with angular distance from the source. The first motions for all components of motion for a dip-slip fault have characteristics governed strongly by the presence of the free surface, and hence differ markedly from the usual radiation patterns for a deeply imbedded source. (Author)

AD-629 857 Fld. 8/11, 8/7, 8/3
CFSTI Prices: HC $2.00 MF $0.50
HAWAII INST OF GEOPHYSICS HONOLULU
SOURCE MECHANISM STUDY OF THE ALASKA EARTHQUAKE AND TSUNAMI OF 27 MARCH 1964. PART I. WATER WAVES. PART II. ANALYSIS OF RAYLEIGH WAVE,
by George Pararas-Carayannis, and Augustine-Furumoto. Dec 65, 49p. Rept. no. HIG-65-17, Contract Nonr-3748 (03),NSF-GF-153 Proj. NR-083-168,
Unclassified report

Descriptors: (*Earthquakes, Alaska), (*Alaska, Earthquakes), (*Water waves, Earthquakes), (*Seismology, Earthquakes), Structural geology, Seismic waves, Ocean waves, Pacific Ocean

The geologic history and a short description of the general geomorphology of the area affected by the 27 March 1964 Alaska earthquake are given. The extent of crustal displacement and the limits of the areas of subsidence and uplift as revealed by geologic evidence are discussed, as well as the method by which the tsunamigenerating area was determined. The dimensions of this tsunami-generating area, its volume of crustal displacement, and the energy associated with the tsunami are calculated. There follows a short discussion on wave activity within and outside the generating area, and the possible generating mechanisms for the tsunami. Included as an appendix are two wave refraction diagrams of the Alaska tsunami drawn for the north Pacific Ocean area. The source mechanism of the Alaska Earthquake of 27 Mar 1964 was investigated by analyzing the Rayleigh wave recorded on the strain seismograph at Kipapa Station, Hawaii. The parameters that gave the best fit to the observed data were: rupture length of 800 km, rupture velocity of 3 km/sec, and direction of rupture line of S30 deg W. The results of this analysis compared favorably with field data of elevation changes, with distribution of epicenters of aftershocks, and with the area of generation of the tsunami as obtained from sea wave refraction diagrams. (Author)

AD-629 971 Fld. 8/11, 8/7
ALBERTA UNIV EDMONTON DEPT OF PHYSICS
SEISMIC ARRIVALS FROM THE EARTH'S UPPER MANTLE,
by G. L. Cumming, and E. R. Kanasewich. 1965, 5p.
Unclassified report

Availability: Published in Nature v206 n4981 p248-9 Apr 17 1965. Copies to DDC users only.

Descriptors: (*Geophysical prospecting, Seismology), (*Seismology, Geophysical prospecting), Underground explosions, Seismic waves, Propagation, Structural geology, Lithosphere, Canada

This communication deals with the recording of signals from energy sources, ranging in size from 2,000 to 20,000 lb. of high explosive. In October 1964, the U.S. Geological Survey detonated a group of charges on the bottom of Lake Superior. Several of these shots were recorded 1,800 km away in the vicinity of Edmonton, Alberta.

AD-629 974 Fld. 8/11, 8/7
ALBERTA UNIV EDMONTON DEPT OF PHYSICS
NEAR-VERTICAL-INCIDENCE SEISMIC REFLECTIONS FROM THE 'CONRAD' DISCONTINUITY.
Revised ed.,
by E. R. Kanasewich, and G. L. Cumming. 24 Mar 65, 7p.
Unclassified report

Revision of manuscript submitted 29 Jan 65.

Availability: Published in Journal of Geophysical Research v70 n14 p3441-6 Jul 15 1965. Copies to DDC users only.

Descriptors: (*Seismology, Geophysical prospecting), (*Geophysical prospecting, Seismology), Underground explosions, Seismic waves, Propagation, Structural geology, Canada

Seismological experiments at a location near Lomond in southern Alberta yielded consistently good reflection quality as the shot-to-detector distance was increased from 1.5 to 15 km. A tapered array of sixteen 7 and 1/2-cps seismometers and multiple holes were used. From a T square versus X square analysis the average velocity from the Mississippian formation (at a depth of 1.7 km) to a strong reflector was found to be 6.37 km/sec. The depth to the reflector was 34 km. This is within 1 km of the depth to a discontinuity obtained on a reversed refraction profile. There is little indication of coherent arrivals between the near-surface layers and the reflector at 11.4 sec, and we are confident that this is a true reflector and not a multiple from some shallower horizon. Traces for the horizontal geophones on some of the records indicate near-normal incidence for the event. There are some weaker reflections at times of up to 15 sec, but more analyses will be necessary in order to determine whether these are primary events. (Author)

AD-630 101 Fld. 8/11
LAMONT GEOLOGICAL OBSERVATORY PALISADES N Y
OBSERVATION OF FREE OSCILLATIONS EXCITED BY A DEEP EARTHQUAKE,
by L. E. Alsop, and J. N. Brune. 31 Jul 65, 13p.
Rept. no. Scientific-6,LGO-858
Contract AF 19 (628)-4082,ARPA Order-292
Proj. AF-8652, Task 865201,
AFCRL 66-121
Unclassified report

Availability: Published in Journal of Geophysical Research v70 n24 p6165-74 Dec 15 1965. Copies to DDC users only.

Descriptors: (*Earthquakes, South America), (*Seismology, Seismic waves), Earth (Planet), Oscillation, Seismographs, Fourier analysis

Fourier analysis of a seismogram of horizontal motion obtained after the magnitude 7-3/4, deep earthquake of August 15, 1965, which occurred on the Peru-Bolivia border, has yielded spectral peaks corresponding to higher spheroidal modes in the period range of 100 to 240 sec and to fundamental mode in the period range of 250 to 700 sec. Good agreement is obtained with theoretical period values for the higher modes calculated for a Gutenberg-Bullen A model earth. On the basis of the amplitude variation of the fundamental-mode free oscillations, it is possible to limit the source mechanism to several possibilities, one of which, dip-slip normal motion along a plane with an angle of dip nearly equal to 45 degrees, agrees with a fault plane solution based on long-period P waves. (Author)

AD-630 404 Fld. 8/11, 8/7
CALIFORNIA INST OF TECH PASADENA SEISMOLOGICAL LAB
FREE OSCILLATIONS EXCITED BY THE ALASKAN EARTHQUAKE.
Revised ed.,
by Stewart W. Smith. 31 Oct 65, 11p. Contract AF 49 (638)-1337 ,AF-AFOSR-62-421
Unclassified report

Revision of manuscript submitted 15 Jun 65.

Availability: Published in Journal of Geophysical Research v71 n4 p1183-93 15 Feb 66. Copies to DDC users only.

Descriptors: (*Earthquakes, Alaska), (*Alaska, Earthquakes), (*Seismology, Alaska),

Earth (Planet), Oscillation, Seismic waves, Graphics, Chile, Geology

Periods of spheroidal and toroidal modes are determined from strain and pendulum recordings of the Alaskan earthquake of March 28, 1964. Combinations of orthogonal strains provide a means for separation and identification of mode types. Results in general confirm the measurements made after the Chilean earthquake of 1960, with a few minor differences attributed to misidentification in the earlier data. A comparison of the mode excitation of the Alaskan and Chilean earthquakes at a single station yields only the estimate that the temporal and spatial extent of these two sources were comparable even though the force systems may well have been quite different. (Author)

AD-630 515 Fld. 8/11, 17/10
CFSTI Prices: HC $4.00 MF $0.75
TELEDYNE INDUSTRIES INC ALEXANDRIA VA EARTH SCIENCES DIV
APPLICATIONS AND DEVELOPMENT OF POLARIZATION (REMODE) FILTERS.
Seismic data lab. rept.,
by James N. Griffin. 4 Apr 66, 114p. Rept. no. SDL-141,
Contract AF 33 (657)-15919 ,ARPA Order-624

Unclassified report

Descriptors: (*Band-pass filters, Polarization), (*Seismology, Data processing systems), Seismic waves, Identification, Seismographs, Instrumentation, Signal -to-noise ratio, Data, Digital recording systems, Earthquakes, Wave analyzers

Polarization filters, designed to detect rectilinear orbital motion recorded on 3-component seismograms, were applied as aids in the detection and identification of the phases pP and sP from eight large teleseismic earthquakes. The filters were designed to pass the frequency bands corresponding to any motion which is at least moderately rectilinear along any direction within a vertical quadrant from which the phases were expected to arrive. Experimental filters of higher selectivity, more appropriate to detecting weak signals in signal-generated noise, were demonstrated in a few examples. (Author)

AD-630 111 **See Fld. 8/7**

8/12. SNOW, ICE, AND PERMAFROST

AD-629 977 Fld. 8/12, 4/2
CFSTI Prices: HC $4.60 MF $0.50
COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER N H
THE DISTRIBUTION OF TEN-METER SNOW TEMPERATURES ON THE GREENLAND ICE SHEET.
Research rept.,
by S. J. Mock, and W. F. Weeks. Sep 65, 50p.
Rept. no. RR-170,
Task DA-IV014501B52A31,

Unclassified report

Descriptors: (*Greenland, Surface temperatures), (*Snow, Greenland), Glaciers, Micrometeorology, Thermal properties, Tables

All available 10-m snow temperatures from the Greenland ice sheet have been collected and analyzed using multiple regression techniques to develop equations capable of accurately predicting these temperatures. The resulting equations show that 10-m snow temperatures in north Greenland and its sub-areas can be accurately predicted from the independent parameters, latitude and elevation. Longitude was found to be another significant parameter in south Greenland. In all cases the values of the multiple correlation coefficients were .928 or greater. Gradients of 10-m snow temperatures vs elevation for north Greenland are close to the dry adiabatic lapse rate, indicating adiabatic warming of katabatic winds as the controlling mechanism in the altitudinal distribution of both mean annual air temperatures and 10-m snow temperatures in dry snow. The data also suggest that south Greenland is colder with respect to its latitude and longitude than north Greenland. An isotherm contour map showing the distribution of 10-m snow temperatures on the Greenland ice sheet calculated from the prediction equations was prepared. A tabulation of the elevations and sources as well as brief studies of Marie Byrd Land and Victoria Land in the Antarctic are included. (Author)

AD-630 116 Fld. 8/12, 20/4
CFSTI Prices: HC $2.60 MF $0.50
COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER N H
SIMULATION OF DRIFTING SNOW.
Research rept.,
by Fuat Odar. Oct 65, 23p. Rept. no. RR-174,
Proj. DA-1V014501B52A31,

Unclassified report

Descriptors: (*Snow, Drift), Simulation, Wind tunnels, Particles, Trajectories, Fluid mechanics

Scale factors which are based on geometric, kinematic and dynamic similarity requirements are derived in order to simulate drifting snow in a wind tunnel. The scale factors related to threshold characteristics involve unknown functions that should be determined if a proper simulation of drifting is desired. The scale factors derived from the equation of motion of the particles apply to the conditions where low frequency turbulence with large eddies occurs. Further research is necessary to extend knowledge of the motion of particles in a medium where high frequency turbulence with small eddies exists. (Author)

AD-630 122 Fld. 8/12, 8/10, 15/1
CFSTI Prices: HC $4.60 MF $0.50
NAVAL WARFARE RESEARCH CENTER STANFORD RESEARCH INST MENLO PARK CALIF
PENETRATION STUDIES OF ICE WITH APPLICATION TO ARCTIC AND SUBARCTIC WARFARE.
Final rept., 17 Mar-1 Nov 65,
by Bernard Ross. Nov 65, 43p. Contract Nonr-2332 (00) Proj. SRI-ETU-2167-613,

Unclassified report

Descriptors: (*Ice, Penetration), Projectiles, Free fall models, Impact tests, Ice islands, Toughness, Arctic region, Warfare, Oceanology, Antisubmarine warfare

Impact tests were made on floating ice slabs with particular attention devoted to the mechanism of penetration. The range of values investigated for the basic parameters was: impact velocity, 8 ft/sec - 21 ft/sec; projectile mass, 4.56 lb - 5.22 lb and penetrator diameter, 5/16 in. - 1-1/4 in. The perforation of ice slabs made from seawater, and at approximately +17F (warm sea ice) is accompanied by the ejection of a shear plug from the test slab, whereas fresh water ice slabs under similar loading conditions fracture into segments along well defined radial cleavage planes. The experiments indicate that a blunt end penetrator profile is significantly more effective in the perforation of warm sea ice than a corresponding penetrator with conical profile. In addition, the order of magnitude of the impact velocity and temperature of the ice slab are important factors that can govern the mechanism of penetration. A simple mathematical model for shear plug ejection, based upon the laws of conservation of linear momentum and mechanical energy, provides correlation between a potential energy quantity containing projectile mass and release height, and a geometric quantity containing penetrator diameter and sea ice thickness. Using these quantities, curves are presented which indicate a threshold-of-perforation boundary for the warm sea ice. Finally, recommendations are made for guiding future investigations in this problem area. (Author)

AD-630 201 Fld. 8/12
CFSTI Prices: HC $1.00 MF $0.50
NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF
SEA ICE STRENGTH STUDIES ON MCMURDO SOUND DURING THE AUSTRAL SUMMER 1964-65.
Rept. for Oct 64-Nov 65,
by R. A. Paige, and C. W. Lee. Mar 66, 27p.
Rept. no. TR-R-437,
Proj. Y-F015-11-01-026,

Unclassified report

Descriptors: (*Ice islands, Antarctic regions), (*Antarctic regions, Ice islands), Sea water, Ice, Mechanical properties, Trafficability, Solar radiation, Degradation

During the austral summer of 1964-65, a study of some of the physical properties of sea ice was made near McMurdo Station, Antarctica, where the sea ice is used extensively for aircraft operations, travel, freight hauling, and docking facilities. Tests of specimens showed that both shear and ring-tensile strengths increased almost linearly as specimen temperature decreased; the strength decreased as the ice sheet became warmer and more nearly isothermal. Average shear strength decreased from 140 psi in late October to a low of 90 psi in late January and then increased to 115 psi by 10 February just before breakup; average ring-tensile strength similarly decreased from 190 psi in mid-December to a low of 145 psi in early February, and then increased to 170 psi by 10 February. Internal deterioration and decrease in strength, thickness, salinity of brine, and temperature gradient are all related to rising temperatures and increased solar radiation during the summer. Development of a reliable method of predicting the bearing capacity of sea ice depends upon more detailed knowledge of the effects of loads, the history of the ice, danger zones and safety factors, and other features to insure safe operation on the ice. (Author)

AD-630 328 Fld. 8/12
CFSTI Prices: HC $3.00 MF $0.75
COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER N H
COLD REGIONS SCIENCE AND ENGINEERING. PART III. SECTION A3C. BLOWING SNOW.
Monograph,
by Malcolm Mellor. Nov 65, 87p. Proj. DA-IVO25001A130,

Unclassified report

Descriptors: (*Snow, Drift), Fluid mechanics, Particles, Wind, Electrical properties, Optical properties

The monograph reviews available information on blowing snow and the formation of snowdrifts. The mechanics of wind transport is discussed, with special emphasis on turbulent diffusion of snow particles in the surface boundary layer. The metering of blowing snow is explained, and field data are given for concentration and flux of snow particles as functions of wing speed and height above the surface. Deposition and erosion of snow is discussed and tunnel modeling is considered. The construction and deployment of snow fences is described, and snow fence performance is analysed. Snow drifting on highways and around structures is considered. Some electrical and optical phenomena are reviewed. (Author)

8/13. SOIL MECHANICS

AD-629 875 Fld. 8/13
CFSTI Prices: HC $1.00 MF $0.50
COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER N H
THREE-DIMENSIONAL YIELD CRITERION OF C-PHI MATERIAL.

Research rept.,
by Shunsuke Takagi. Oct 65, 24p. Rept. no. RR-179,
Task DA-1V014501B52A31,
Unclassified report

Descriptors: (*Soil mechanics, Mathematical analysis), Soils, Deformation, Plasticity, Geometry

A general three-dimensional yield criterion of an ideal soil, called c-phi material, is determined that can coincide with the Shield yield criterion and the Drucker-Prager yield criterion by giving appropriate values to the parameters contained. When expressed on an octahedral plane in the principal-stress space, the yield criterion is represented by a hexagon of curved sides formed of conic sections. The geometric relationships satisfied by a family of curved hexagons are investigated. (Author)

AD-630 111 See Fld. 8/7

8/14. TERRESTRIAL MAGNETISM

AD-629 985 Fld. 8/14, 18/3, 4/1
MOUNT AUBURN RESEARCH ASSOCIATES INC CAMBRIDGE MASS
INTERPRETATION OF EARLY MAGNETIC TRANSIENTS CAUSED BY HIGH-ALTITUDE NUCLEAR DETONATIONS.
Environmental research papers. Revised ed.,
by S. L. Kahalas, and P. Newman. 12 Feb 65, 9p.
Contract AF 19 (628)-2833,MIPR-566-63 Proj. AF-8653,
AFCRL ERP-167 ,AFCRL 66-45
Unclassified report

Presented at the ULF Symposium, Boulder, Colo., 17-20 Aug 64. Revision of manuscript received 3 Feb 65.

Availability: Published in Radio Science Journal of Research NBS/USNG-URSI v69D n8 p1179-83 Aug 1965. Copies to DDC users only.

Descriptors: (*Nuclear explosions, High altitude), (*Terrestrial magnetism, Explosion effects), Ionospheric disturbances, Magnetohydrodynamics, Magnetic fields, Transients, Propagation, Detection

A high-altitude nuclear detonation produces magnetic disturbances which propagate to points remote from the detonation area. The worldwide magnetic disturbances occurring within a few seconds after the detonation are discussed. Data from Starfish are presented to show the general characteristics of the early-time magnetic field behavior. Various interpretations of these results are discussed. In particular, there is a signal occurring within a few tenths of a second after the detonation. This is interpreted to be the conventional electromagnetic pulse produced by asymmetric absorption of gamma rays in the lower atmosphere. The pulse propagates to far distances in the earth-ionosphere cavity. In addition, worldwide data show a second signal occurring within 1.5 to 2 sec after the Starfish detonation. This is also interpreted as an electromagnetic wave propagating in the earth-ionosphere cavity. It is generated by a bombinduced magnetohydrodynamic wave which propagates downward from the vicinity of the detonation and is converted to electromagnetic form at the lower boundary of the ionosphere. (Author)

Field 9-ELECTRONICS AND ELECTRICAL ENGINEERING

9/1. COMPONENTS

AD-629 890 Fld. 9/1, 9/5
CFSTI Prices: HC $2.00 MF $0.50
ELECTRONIC DEFENSE LABS SYLVANIA ELECTRONIC SYSTEMS-WEST MOUNTAIN VIEW CALIF
MULTILAYER BOARD APPLICATION TO RF CIRCUITRY.
Technical memo.,
by Mark Hurowitz, and William E. Berg. 24 Nov 65, 46p. Rept. no. EDL-M889,
Contract DA-28-043-AMC-00379 (E)
Unclassified report

Descriptors: (*Microminiaturization (Electronics), Printed circuits), (*Printed circuits, Radiofrequency), Miniature electronic equipment, Circuits, Very high frequency, Ultrahigh frequency, Waveguides, Amplifiers, Design, Transistors, Performance (Engineering)

Investigation of miniaturization techniques suitable for a quick reaction facility was continued, and techniques developed during previous R and D programs were improved. Applications of miniaturization techniques to linear circuits in the very high and ultra high frequency ranges were made successfully. Extensive use of multiple-layer, printed wiring boards was made to maintain and update the state of the art in the laboratory. These boards were designed to fit into extrusions to give support and isolation to the circuit. Performance data are included in the report, with an analysis of the major components of the designs. (Author)

AD-629 893 Fld. 9/1, 13/8
CFSTI Prices: HC $4.00 MF $0.75
MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV
PRODUCTION ENGINEERING MEASURE FOR A GERMANIUM PNP POWER TRANSISTOR.
Quarterly progress rept. no. 2, 14 Jul-14 Oct 65,
by Dan Sullivan, and Paul Greer. 14 Oct 65, 121p. Rept. no. G-16,
Contract DA-36-039-AMC-06161 (E), Proj. DA-26099,
Unclassified report

See also AD-623 265.

Descriptors: (*Transistors, Germanium), (*Germanium, Transistors), Manufacturing methods, Processing, Electrical properties, Reliability (Electronics), Quality control, Performance (Engineering)

This report covers the engineering investigations conducted during the report period designed to improve the reliability yields and parameter distributions of the SP-188H germanium power PNP transistor. Results not previously reported are included. (Author)

AD-629 913 Fld. 9/1, 13/8
CFSTI Prices: HC $1.00 MF $0.50
PIEZO CRYSTAL CO CARLISLE PA
PEM QUARTZ CRYSTAL UNITS, FILTER LOW FREQUENCY 1 MC TO 10 MC. TYPES CR- (XM-49)/U THRU CR- (XM-52)/U.
Quarterly progress rept. no. 6, 1 Oct-31 Dec 65,
by A. S. Matistic. 14 Feb 66, 23p. Contract DA-36-039-AMC-03635 (E),
Unclassified report

See also AD-625 890.

Descriptors: (*Crystal filters, Manufacturing methods), (*Quartz, Crystal filters), High frequency, Medium frequency, Crystal holders, Performance (Engineering)

In the search for a solution to complex technical problems with the mass loading technique at frequencies 5 mc and 6 mc, three series of crystal designs were progressively introduced to uncover the role of other factors besides plateback in the suppression of unwanted modes. Although conventional crystal processing techniques were adequate to resolve problems at the 6 mc frequency, unconventional processing was required to achieve comparable progress at the 5 mc frequency. These fabricating techniques are described in the report. Parallel work effort, including the design and construction of plating masks and crystal mounts (for the high frequency vibration aspects of the PEM), is also described. (Author)

AD-629 930 Fld. 9/1, 13/8, 9/3, 11/9
CFSTI Prices: HC $2.00 MF $0.50
ELECTRONIC DEFENSE LABS SYLVANIA ELECTRONIC SYSTEMS-WEST MOUNTAIN VIEW CALIF
TECHNIQUES FOR MICROWAVE COMPONENTS OF REDUCED WEIGHT.
Technical memo.,
by Irwin J. Steinhardt, Hyman Plutchok, Mark Hurowitz, and Daryl W. Shipley. 9 Nov 65, 42p.
Rept. no. EDL-M888,
Contract DA-28-043-AMC-00379 (E),
Unclassified report

Descriptors: (*Miniature electronic equipment, Microwave equipment), (*Waveguides, Expanded plastics), X band, Resonators, Styrene plastics, Dielectrics, Weight, Dielectric properties, Processing, Acrylic resins, Molding, Performance (Engineering)

During the period of this report consideration was given principally to waveguide components in X-band which are inherently heavy and bulky. A substantial saving in weight can be accomplished if the relatively heavy waveguide walls and flanges which confine the microwave energy are replaced by thin metal surfaces which are supported mechanically by lightweight materials. Two methods for this support have been investigated. The results achieved from microwave resonators fabricated by these two means are presented in this technical memorandum. In addition there has been a study of foam-in-place techniques with polyurethane foam and the effects of loading the foam with high dielectric constant fillers. The results of this work are also reported in this memorandum. To fabricate the resonators mentioned above involves the development of molding techniques which are described in the text. The techniques evolved on this program permit the fabrication of structures with very close tolerances.

AD-629 948 Fld. 9/1, 18/8
CFSTI Prices: HC $2.00 MF $0.50
HUGHES AIRCRAFT CO FULLERTON CALIF
RADIATION EFFECTS ON (MONOLITHIC) MICROELECTRONIC CIRCUITS.
Quarterly rept. no. 2, 1 Aug-31 Oct 65,
by C. W. Perkins, E. P. Mitchell, R. W. Marshall, and A. M. Liebschutz. Mar 66, 36p. Rept. no. FR-65-10-252,
Contract DA-28-043-AMC-01313 (E), Proj. DA-5900-21.830.23, Task 16.0091,
ECOM 01313-2
Unclassified report

See also AD-624 561.

Descriptors: (*Microminiaturization (Electronics), Radiation damage), (*Radiation damage, Semiconductors), (*Semiconductors, Radiation damage), Integrated circuits, Radiation measurement systems, Reliability (Electronics), Transistors, Diodes (Semiconductor), Wiring diagrams, Gates (Circuits)

Phase 1 (Circuit Evaluation: Evaluation of radiation effects in available circuits) was initiated during the second quarter with the Linac tests for the evaluation of transient radiation effects in thirty-four types of commercially available microcircuits of the DTL, RTL, and RCTL logic types. An evaluation of the results was made by relating the experimentally measured output voltage responses to the circuit noise margins. The results show, in general, the RCTL circuits are the most sensitive to transient radiation effects, that DTL circuits with internal load resistors are less sensitive than

those without resistors, and that low power RTL gates are more sensitive than either the standard RTL gate or the RTL power gate. (Author)

AD-629 954 Fld. 9/1
SASKATCHEWAN UNIV SASKATOON DEPT OF ELECTRICAL ENGINEERING
HIGH-FREQUENCY PROPERTIES OF FOUR-TERMINAL FIELD-EFFECT TRANSISTORS,
Revised ed.,
by R. S. C. Cobbold. 27 Sep 65, 10p. Contract DRB-5501-32,
Unclassified report

Revision of manuscript submitted 14 Jun 65.

Availability: Published in Proc. IEE v113 n1 p73-82 Jan 1966. Copies to DDC users only.

Descriptors: (*Transistors, Electrical properties), Capacitance, High frequency, Mathematical analysis, Theory

The high-frequency properties of the four-terminal field-effect transistor are examined. Using the device charge equations, various intrinsic capacitances are defined, and expressions are obtained for their variation with voltage. From these equations and a knowledge of the intrinsic and extrinsic structure of these devices, an equivalent circuit is proposed, which is shown to be in reasonable agreement with experimental observations. The intergate capacitance is examined in some detail, and an explanation of the very abrupt capacitance changes observed experimentally is given. Careful attention is paid to distinguishing between the device's intrinsic and extrinsic properties and correctly comparing experimental and theoretical results. (Author)

AD-630 063 Fld. 9/1, 20/12
CFSTI Prices: HC $2.60 MF $0.50
BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD
AN ANALYTICAL APPROACH TO TRANSISTOR APPLICATION.
Memorandum rept.,
by Keats Pullen,Jr.. Aug 65, 21p. Rept. no. BRL-MR-1701,
Proj. RDT/E-1L013001A91A,
Unclassified report

Descriptors: (*Transistors, Theory), Mathematical analysis, Solid state physics, Circuits, Electronics, Stabilization, Design

The solid-state equations defining semiconductor action in a transistor are shown to provide an analytic basis for the calculation of the behavior of a transistor in its circuit. Input and output relations and transfer relations are developed from these equations, and data on relative reliability of existing methods are developed. An example is presented which shows the ease and simplicity with which circuit design problems may be solved based on the approach. (Author)

AD-630 064 Fld. 9/1, 20/12
CFSTI Prices: HC $2.60 MF $0.50
BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD
ON THE INFLUENCES OF CHANGES OF CARRIER DENSITY ON THE CURRENT FLOW IN A CHANNEL,
by Keats A. Pullen,Jr., and Lee Evans. Sep 65, 26p. Rept. no. BRL-1301,
Proj. RDT/E-1L013001A91A,
Unclassified report

Prepared in cooperation with Siliconix, Inc., Sunnyvale, Calif. Supported in part by DASA, Task no. 07-512T.

Descriptors: (*Transistors, Theory), Carriers (Semiconductors), Electric currents, Theory, Mathematical analysis

A study was made of the effect of varying the density of free charge carriers in a semiconductor channel under the influence of a retarding field. It was found that the conditions required for charge binding in the space-charge region are dramatically altered by changes in the distribution of charge. The transconductance per unit current is also drastically altered. Based on the study, it can be presumed that significantly more efficient field effect transistors can be built than have been obtained to date. (Author)

AD-630 092 Fld. 9/1, 14/2
CFSTI Prices: HC $2.60 MF $0.50
STANFORD RESEARCH INST MENLO PARK CALIF
FULL-SCALE HF ANTENNA PATTERN MEASUREMENTS MADE WITH TRANSMITTER TOWED BY AIRCRAFT.
Research memo.,
by Cecil Barnes. Jan 63, 21p. Rept. no. RM-9, Contract DA-36-039-sc-87197, Proj. SRI-3670,
Unclassified report

Descriptors: (*Antenna radiation patterns, Test methods), Radio transmitters, Towed bodies, Flight tests, Log periodic antennas

The radiation pattern of a large antenna over an irregular ground plane of uncertain conductivity is generally difficult or impossible to calculate; the unknown ground losses also complicate the use of modeling techniques. It therefore becomes necessary to make full -scale measurements in the field. If it is necessary to know the radiation pattern for angles above the horizon, the use of an airplane or helicopter is indicated. Of the various flight paths that can be visualized, those convenient to use in practice are: vertical descents, straight overhead runs, straight 'fly-by' runs that do not go overhead, and circular paths around a fixed ground point. This memorandum deals with a method of making flight tests using the latter plan, an airplane flying around the unknown ground antenna on a circular path while transmitting a constant signal. Receiving equipment on the ground records the voltage induced at the antenna terminals as a function of azimuth angle; from this information the antenna pattern (which is the same for either transmitting or receiving) can be plotted. (Author)

AD-630 188 Fld. 9/1
MINNESOTA UNIV MINNEAPOLIS DEPT OF ELECTRICAL ENGINEERING
LOW FREQUENCY NOISE SUPPRESSION IN SPACE CHARGE LIMITED SOLID STATE DIODES.
Revised ed.,
by A. van der Ziel. 20 Sep 65, 5p. Contract DA-31-124-ARO (D)-291,
AROD 5117:1
Unclassified report

Revision of manuscript submitted 6 Aug 65.

Availability: Published in Solid-State Electronics v9 p123-7 1966. Copies to DDC users only.

Descriptors: (*Diodes (Semiconductor), Noise (Radio)), Space charges, Low frequency, Electrical conductance

The noise suppression in solid state space charge limited diodes is calculated in two ways. In the first theory the noise in the open-circuited diode is attributed to carrier density fluctuations in the potential minimum. This gives an expression for the noise that contains an unknown parameter. In the second theory the noise in the short-circuited diode is considered as a convection current fluctuation in the potential minimum that is partly suppressed by corresponding fluctuations in the depth of the potential minimum. This gives an expression for the noise that does not contain any unknown parameter. The results indicate that the noise of the device is much less than thermal noise of the differential conductance of the device, and that the noise resistance R (n) of the device has the low value R (n) = 1/2 (kT/qI (a)).

AD-630 195 Fld. 9/1, 13/8
CFSTI Prices: HC $5.60 MF $0.75
SYLVANIA ELECTRIC PRODUCTS INC WOBURN MASS SEMICONDUCTOR DIV
PRODUCTION ENGINEERING MEASURE (PEM) FOR SILICON MIXER DIODE.
Quarterly progress rept. no. 3, 1 Oct-31 Dec 65, by G. Bowne, R. Bayliss, and C. Brunquell. 31 Dec 65, 54p. Contract DA-36-039-AMC-06159 (E)
Unclassified report

See also AD-625 755.

Descriptors: (*Crystal mixers, Diodes (Semiconductors)), (*Diodes (Semiconductors), Crystal mixers), Mixers (Electronic), Silicon, Reliability (Electronics), Processing, Performance (Engineering), Life expectancy, Tests, Manufacturing methods, Thermal properties, Electrical properties, Packaging

The third engineering test sample run was initiated using the new package design based on a beryllium oxide body with an improved ceramic to metal seal and thermocompression bonding of the die. Preliminary screening of these units indicate more work may be necessary to optimize the tungsten whisker contact. Analysis of Group B test data on units from the second engineering test sample run show environmental test results considerably improved compared to those on units from the first engineering test sample run. (Author)

AD-630 196 Fld. 9/1, 13/8
CFSTI Prices: HC $5.60 MF $0.75
SYLVANIA ELECTRIC PRODUCTS INC WOBURN MASS SEMICONDUCTOR DIV
PRODUCTION ENGINEERING MEASURE (PEM) FOR SILICON VARACTOR DIODE.
Quarterly progress rept. no. 3, 1 Oct-31 Dec 65, by G. Bowne, and R. Bayliss. 31 Dec 65, 54p. Contract DA-36-039-AMC-06159 (E)
Unclassified report

See also AD-625 756.

Descriptors: (*Varactor diodes, Manufacturing methods), (*Silicon, Varactor diodes), Diodes (Semiconductor), Reliability (Electronics), Processing, Performance (Engineering), Life expectancy, Storage, Tests, High-temperature research, Assembly, Thermal properties, Electrical properties, Packaging, Mechanical drawings

Group B tests, were completed on units from the Second Engineering Test Sample Run. Process changes were made during the quarter to incorporate the use of silicon junctions of the planar structure for the Third Engineering Test Sample Run as opposed to the mesa structure used for fabrication of units in the first two runs. Preliminary tests on units from the third run indicate considerable improvement particularly in regard to thermal resistance characteristics, uniformity of parameter distributions, and ability to withstand high temperature storage testing. (Author)

AD-630 250 Fld. 9/1
CFSTI Prices: HC $9.60 MF $0.75
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J ELECTRONIC COMPONENTS LAB
A STUDY OF VOLTAGE BREAKDOWN PHENOMENA IN THE MODULATING ANODE REGION OF HIGH-POWER MICROWAVE TUBES.
Technical rept.,
by G. Wurthmann, P. Richmond, P. Fischer, and F. Sherburne. Feb 66, 94p. Proj. DA-1L0-13001-A-91A Task 1L0-13001-A-91A-17, ECOM 2656
Unclassified report

Descriptors: (*Anodes (Electron tubes), Failure (Electronics)), (*Electron tubes, Failure

(Electronics)), Electron guns, Microwave equipment, Voltage, Electrical properties, Test equipment (Electronics)

An experimental and analytical program has been underway to study the relationship between various geometrical electrode configurations, spacings, materials, and surface finishes as functions of voltage in the electron gun region of high-power, modulating anode types of linear beam microwave tubes. The necessary experimental processing equipment and the high-voltage test facility needed for checking experimental structures have been designed, constructed, tested, and evaluated. The equipment component design features are discussed in detail. Design and construction features of the first experimental test vehicle are reviewed in depth. This test vehicle has been fully evaluated and the results agree with predicted Fowler-Nordheim current-voltage relationships. Appropriate computer and trajectory plotter programs have been set up for determining equipotential plots and for analyzing beam behavior. The plotter and computer equipment is reviewed, the programming features are outlined, and the applicable techniques for the theoretical design and analysis of electrode configurations and beam behavior are discussed. (Author)

AD-630 252 Fld. 9/1, 13/8
CFSTI Prices: HC $1.00 MF $0.50
SPRAGUE ELECTRIC CO NORTH ADAMS MASS
PRODUCTION ENGINEERING MEASURE FOR IMPROVED RELIABILITY OF SOLID ELECTROLYTE TANTALUM CAPACITORS.
Quarterly rept. no. 9, 29 Jun-29 Sep 65, by J. M. Eckfeldt, and J. H. D. Folster. 29 Sep 65, 11p. Contract DA-36-039-AMC-03621 (E),

Unclassified report

See also AD-623 107.

Descriptors: (*Tantalum capacitors, Manufacturing methods), Life expectancy, Electrolytic capacitors, Production, Processing, Reliability (Electronics)

The 10,000-hr life test of 9150 capacitors of nine different ratings is under way. Readings from a statistically randomized sample are presented. (Author)

AD-630 253 Fld. 9/1, 13/8
CFSTI Prices: HC $1.00 MF $0.50
SPRAGUE ELECTRIC CO NORTH ADAMS MASS
PRODUCTION ENGINEERING MEASURE FOR IMPROVED RELIABILITY OF SOLID ELECTROLYTE TANTALUM CAPACITORS.
Quarterly rept. no. 10, 29 Sep-29 Dec 65, by J. H. D. Folster, and E. J. Fresia. 29 Dec 65, 11p. Contract DA-36-039-AMC-03621 (E),

Unclassified report

See also AD-630 252.

Descriptors: (*Tantalum capacitors, Manufacturing methods), Life expectancy, Electrolytic capacitors, Production, Processing, Reliability (Electronics)

The 10,000-hr life test of 9150 capacitors of nine different ratings has reached the 2000-hr point. Readings from a statistically randomized sample are presented. (Author)

AD-630 317 Fld. 9/1, 20/12, 13/8
CFSTI Prices: HC $3.00 MF $0.50
SPERRY MICROWAVE ELECTRONICS CO CLEARWATER FLA
PRODUCTION ENGINEERING MEASURE YIG SPHERES AND LIMITERS.
Quarterly technical progress rept. no. 10, 29 Aug-29 Nov 65, by J. E. Andrews, L. R. Hodges,Jr., and D. E. Tribby. 29 Nov 65, 54p. Contract DA-36-039-AMC 01477 (E),

Unclassified report

Descriptors: (*Ferroelectric crystals, Manufacturing methods), (*Limiters, Manufacturing methods), (*Spheres, Single crystals), Crystal growth, Gallium alloys, Yttrium alloys, Intermetallic compounds, Iron alloys, Garnet, L-band, Magnetic fields, Processing, Reliability (Electronics), Polishing

A new figure 8 sphere polisher was substantially improved, and its performance now surpasses previous models. The preproduction limiters and spheres met the required tests and were accepted and shipped.

AD-630 344 Fld. 9/1, 18/8
CFSTI Prices: HC $6.60 MF $0.75
MARTIN CO BALTIMORE MD
RADIATION EFFECTS ON INSULATED GATE FIELD EFFECT (MOS) INTEGRATED CIRCUITS.
Quarterly technical rept. no. 1, 1 Jul-30 Sep 65, by David M. Long, Harold L. Flescher, and Stanley E. Harrison. Apr 66, 61p. Contract DA-28-043-AMC-01520 (E), Proj. DA-5900-21-830-44-00, ECOM 01420-1

Unclassified report

Descriptors: (*Integrated circuits, Radiation damage), (*Radiation damage, Integrated circuits), Metals, Oxides, Semiconductors, Transistors, Solid state physics

The preliminary theoretical analysis of permanent radiation effects on MOS devices indicates that after 10 to the 14th power neutrons/sq cm the average carrier mobility in the channel decreases about 5%, the reverse leakage current of the drain-substrate p-n junction (I sub pno) increases by a factor of 10 to 100, the terminal capacitances (C sub gs, C sub gd, and C sub ds) are not significantly changed except for the bias dependence of the channel capacitance which is influenced by shifts in threshold voltage (V sub T), and the drain current transconductance, and channel conductance are significantly influenced by the variations in V sub T. The predicted changes in V sub T due to bulk damage in the substrate are too small to account for the V sub T changes observed experimentally by several workers in the field. The changes in V sub T are apparently caused by a redistribution of charge in the oxide, but the exact damage mechanism has not been established at this time. The analysis of transient effects revealed that the dominant response mechanisms are charge scattering from the device leads; leakage resistance as dictated by ionization of the gas inside the encapsulated device; transient gate current resulting from the generation of carriers in the transverse electric field of the channel; and transient drain current resulting from the primary photocurrent of the drain p-n junction.

AD-630 394 Fld. 9/1, 10/1, 11/3
CFSTI Prices: HC $9.60 MF $0.75
DELCO RADIO DIV GENERAL MOTORS CORP KOKOMO IND
STUDY OF GERMANIUM DEVICES FOR USE IN A THERMOPHOTOVOLTAIC CONVERTER.
Quarterly rept. no. 2, 1 Oct 65-1 Jan 66, by D. P. Crouch, and R. W. Beck. Mar 66, 97p. Contract DA-28-043-AMC-01420 (E), Proj. DA-1C6-22001-A053, Task 1C6-22001-A05301, ECOM 01420-2

Unclassified report

See also AD-624 868.

Descriptors: (*Photoelectric cells (Semiconductor), Germanium), (*Germanium, Photoelectric cells (Semiconductor)), Energy conversion, Optical coatings, Surface properties, Adsorption, Moisture, Electrical properties, Vacuum, Epitaxial growth, Coatings

Studies were made of the effects of surface adsorbed moisture on the performance of uncoated N on P+ and P on N+ devices. A preliminary evaluation of the effect of donor concentration variations in the N+ layer of the P on N+ device was made. The evaluation of the optical and electrical properties of anti-reflection coated devices supplied by four firms was completed. A study of the effects of moisture on the performance of antireflection coated devices was initiated. The influence of a vacuum environment on device performance was determined in the case of both uncoated and anti-reflection coated devices. A model which explains the performance behavior of devices under the influence of various ambient environments was presented and verified experimentally. P+ on N non-absorptive devices were fabricated by epitaxial deposition in the close-spaced transport system. The highest power output observed was 250 milliwatts-device. The presence of very high reverse saturation current limits the open circuit voltage but the short circuit currents are comparable tho those obtained with absorptive devices. (Author)

AD-630 437 Fld. 9/1, 13/8
CFSTI Prices: HC $1.00 MF $0.50
SPRAGUE ELECTRIC CO NORTH ADAMS MASS
PRODUCTION ENGINEERING MEASURE FOR MECHANIZATION OF HIGH-RELIABILITY CAPACITORS.
Quarterly rept. no. 12, 30 Sep-30 Dec 65, by J. H. D. Folster, and G. E. Walters. 31 Dec 65, 12p. Contract DA-36-039-AMC-01460 (E),

Unclassified report

Descriptors: (*Paper capacitors, Manufacturing methods), (*Capacitors, Reliability (Electronics)), Conveyors, Soldering, Machines, Industrial equipment, Effectiveness, Plastics

Work during this period consisted of making additional modifications to the machines in order to optimize their efficiency.

AD-630 474 Fld. 9/1, 9/3
CFSTI Prices: HC $4.60 MF $0.50
MICHIGAN UNIV ANN ARBOR ELECTRON PHYSICS LAB
SEMICONDUCTOR AND O-TYPE AMPLIFIER INVESTIGATIONS.
Quarterly progress rept. no. 5, 1 Sep-1 Dec 65, by J. E. Rowe. Mar 66, 43p. Contract AF 30 (602)-3569, Proj. AF-5573, Task 557303, RADC TR-66-20

Unclassified report

See also AD-626 806.

Descriptors: (*Traveling-wave tubes, Electron optics), (*Amplifiers, Traveling-wave tubes), Ultrahigh frequency, Klystrons, Electron guns, Electron beams, Radiofrequency, Modulation, Magnetrons, Noise (Radio)

Specific results on saturation gain and efficiency for Brillouin beam traveling-wave amplifiers are presented as a function of beam injection velocity and magnetic field strength. It is found that the saturation gain and output are higher for the Brillouin-focused device than for the rectilinear-flow device. A perturbational analysis of the small-C nonlinear TWA equations was undertaken. Testing of the microperv gun was terminated due to the failure of its heater. The design of a device for determining the effect of large-amplitude r-f signals on an electron beam was completed. Errors in the space-charge calculations for high-convergence electron guns were corrected and as a result greater accuracy and agreement with experiments were obtained. Although improvements were made in the magnetron injection gun program, it is still difficult to obtain proper convergence in the vicinity of the cathode. A UHF helix-type traveling-wave amplifier with a magnetron injection gun was studied experimentally with regard to the noise characteristics of the gun and the beam in the interaction region. Reasonably low noise figures were

obtained at reduced beam current and it is expected that lower noise figures will be realized when the amplifier is operated at rated current. (Author)

AD-629 781 See Fld. 9/3

AD-629 892 See Fld. 17/9

AD-629 904 See Fld. 20/14

AD-629 942 See Fld. 11/2

AD-629 946 See Fld. 13/8

AD-629 950 See Fld. 9/5

AD-630 001 See Fld. 13/8

AD-630 209 See Fld. 20/14

AD-630 492 See Fld. 14/2

9/2. COMPUTERS

AD-629 766 Fld. 9/2, 9/4
CFSTI Prices: HC $4.00 MF $1.00
GENERAL DYNAMICS/ELECTRONICS ROCHESTER N Y
ADAPTIVE PROGRAMMING TECHNIQUES FOR CIRCUIT DESIGN.
Final rept. 21 Aug 64-21 Aug 65,
by Donald F. Smith, Amante S. Parungao, and Carl J.Zarcone. Feb 66, 156p. Contract AF 30 (602)-2961, Proj. AF-5581, Task 558104, RADC TR-65-394

Unclassified report

Descriptors: (*Pattern recognition, Computer logic), (*Adaptive communication systems, Pattern recognition), Circuits, Design, Decision theory, Statistical functions, Equations, Digital systems, Analog systems, Programming (Computers), Communication theory, Probability, Sampling

This report covers the evaluation of various pattern recognition techniques previously developed and reported in 'Adaptive Programming Techniques for Circuit Design', (AD-602 110). New techniques developed under the current contract are also evaluated. The evaluation of the relative merits of each technique is based on how well it succeeds in minimizing the classification error rate in the recognition of the population while learning on the sample pattern set. A sample pattern recognition problem, consisting of two population distributions and a sample pattern set obtained from these population distributions, is generated. This sample problem is used in assessing the relative merits of the various techniques. (Author)

AD-629 788 Fld. 9/2
CFSTI Prices: HC $4.00 MF $0.75
NAVAL ORDNANCE LAB WHITE OAK MD
THE DISAC MAGNETIC TAPE SYSTEM AND PERIPHERAL EQUIPMENT CONTROLS,
by C. N. Pryor, and R. H. Davis. 21 Dec 65, 114p. Rept. no. NOLTR-64-158, Task ASW2-13000/212-1/F101-10-02,

Unclassified report

See also AD-610 052.

Descriptors: (*Digital computers, Simulation), (*Weapon systems, Simulation), (*Magnetic tape, Digital computers), Input-output devices, Punched cards, Punched tape

The report describes the characteristics and operation of the digital input-output devices attached to the DISAC system. Detailed operating characteristics of each device are given, from the viewpoint of the user. Descriptions and complete diagrams of all control circuitry are given to facilitate system maintenance. (Author)

AD-629 836 Fld. 9/2, 12/1
CASE INST OF TECH CLEVELAND OHIO
AN ADAPTIVE NETWORK FOR PRODUCING REAL FUNCTIONS OF BINARY INPUTS,
by Earl E. Gose. 10 Jun 63, 14p. Contract Nonr-1141 (09) ,AF-AFOSR-751-65 AFOSR 65-2686

Unclassified report

Availability: Published in Information and Control v8 n2 p111-23 Apr 1965. Copies to DDC users only.

Descriptors: (*Adaptive systems, Computer logic), (*Computer logic, Adaptive systems), (*Binary arithmetic, Computer logic), (*Special functions (Mathematical), Synthesis), Real numbers, Functions, Networks, Input-output devices

An adaptive network which can produce any real-valued function of its binary inputs is presented. The network can synthesize any Boolean function as a special case. The appropriate values of the adjustable parameters may be calculated by the network itself, or they may be calculated by a simple linear operation. The parameters form a uniformly distributed memory for the inputoutput function. (Author)

AD-629 851 Fld. 9/2
NORTHWESTERN UNIV EVANSTON ILL DEPT OF ELECTRICAL ENGINEERING
AUTONOMOUS CLOCKS IN SEQUENTIAL MACHINES.
Revised ed.,
by S. S. Yau. 1 Feb 65, 8p. Contract AF-AFOSR-98-65, AFOSR 65-2349

Unclassified report

Revision of manuscript submitted 3 Sep 64.

Availability: Published in IEEE Transactions on Electronic Computers vEC-14 n3 p467-72 Jun 1965. Copies to DDC users only.

Descriptors: (*Digital computers, Sequential analysis), (*Sequential analysis, Computer logic), (*Computer logic, Sequential analysis), Data processing systems

A necessary and sufficient condition for the existence of an autonomous clock in a sequential machine M is found to be the existence of a nontrivial input-independent partition on the set of internal states of M, no matter whether M is completely specified or incompletely specified. Two different techniques are given for generating the smallest input-independent partition, pi to the 1st power, from which all other input-independent partitions can be obtained. One is suitable for a sequential machine whose state behavior is specified in the form of a flow table, while the other is convenient for a sequential machine whose state behavior is specified in the form of a connection matrix. Both techniques are efficient, and give all possible assignments to the redundant conditions of an incompletely specified sequential machine to reach the same nontrival input-independent partition, and hence the same autonomous clock. (Author)

AD-629 867 Fld. 9/2
CFSTI Prices: HC $7.60 MF $0.75
GENERAL ELECTRIC CO WASHINGTON D C
THE APPLICATION OF LARGE-SCALE COMPUTERS TO U.S. AIR FORCE INFORMATION SYSTEMS.
Final rept., 15 Jan 65-15 Jan 66,
by John B. Campbell, John P. McCabe, and Essie S. Nevans. Mar 66, 77p. Contract AF 19 (628)-4963, Proj. AF-2801 Task 280101, ESD TE-66-137

Unclassified report

Descriptors: (*Air force, Wages), (*Computers, Personnel management), (*Air force personnel, Computers), Mathematical models, Algorithms, Feasibility studies, Remote control systems

Two Air Force functions were examined to determine the feasibility of centralizing the tasks at a computer center with remote access. The applications examined: (1) an overall pay system, and (2) a system to aid in the assignment of personnel to jobs, proved interesting in their demands upon large-scale data-handling and manipulation capabilities. Feasibility of both the pay and man-job match systems was shown and each was examined as a time-sharing type of application. The generalized time-sharing model showed centralization of all computational power to be more economical than distributing logical capability to remote stations. Three supporting analytic studies were performed. The first deals with a means for partitioning a large file to permit, in some cases, greatly reduced searching times. The second deals with a mathematical model for a time-shared computer system which allows for analytical calculation of processing times at each terminal as a function of system loading. The third investigates three computational algorithms for performing man-job match calculations. Estimates of processing times are given, and the methods compared. (Author)

AD-629 877 Fld. 9/2, 12/1
CFSTI Prices: HC $4.00 MF $0.75
CALIFORNIA UNIV SAN DIEGO LA JOLLA INST OF GEOPHYSICS AND PLANETARY PHYSICS
A USER'S GUIDE TO BQMM. A SYSTEM OF PROGRAMS FOR THE ANALYSIS OF TIME SERIES,
by E. C. Bullard, F. E. Oglebay, W. H. Munk, and G. R. Miller. Jan 66, 116p. Contract NSF-13575,

Unclassified report

Descriptors: (*Programming (Computers), Statistical analysis), (*Series, Numerical analysis), (*Data processing systems, Programming (Computers)), Time, Data, Compilers, Control sequences, Instruction manuals, Digital computers

BOMM is a system of programs which causes an electronic computer to perform arithmetic operations on time series. In devising the system the main objectives were: (1) to enable a wide variety of data formats to be accepted without recoding; (2) to allow gross errors to be removed automatically from the data; (3) to provide a considerable variety of arithmetic operations and leave the user free to choose the order in which they are applied; and (4) to allow further processes to be incorporated into the system. The present User's Guide provides the information needed by the user in operating the system. More complete details, including flow diagrams of the programs, are given in a longer work entitled, Manual of the BOMM System of Programs for the Reduction of Time Series.

AD-630 014 Fld. 9/2, 20/6, 20/12
NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF
COMPUTATIONAL METHOD FOR DETERMINING N AND K FOR A THIN FILM FROM THE MEASURED REFLECTANCE, TRANSMITTANCE, AND FILM THICKNESS.
Research rept.,
by Jean M. Bennett, and Maxine J. Booty. 12 May 65, 6p. Rept. no. NOTS-TP-4052, Task R360-FR-106/216-1/R011-01-01, NAVWEPS 9047

Unclassified report

Availability: Published in Applied Optics v5 n1 p41-3 Jan 1966. Copies to DDC users only.

Descriptors: (*Films, Optical properties), (*Optical properties, Films), Programming (Computers), Reflection, Thickness, Thin film storage devices, Quartz, Silicon, Aluminum

A computational method of determining n and k for an evaporated film has been programmed for an IBM 7094 computer and consists of modifica-

tions to the NOTS multilayer film program. (W. F. Koehler J. Opt. Soc. Am. 45:934 (1955)). The basic program computes normal incidence reflectance, transmittance, phase change on reflection, and other parameters from the optical constants and thicknesses of all materials. In the modification, n and k for the film are varied in a prescribed manner, and the computer picks from among these values one n and one k which yield reflectance and transmittance values almost equalling the measured values. Results are given for films of silicon and aluminum. (Author)

AD-630 022 Fld. 9/2, 9/5
CFSTI Prices: HC $2.00 MF $0.50
RCA LABS PRINCETON N J
ACTIVE LOGIC ELEMENTS USING NON-GALVANIC MODIFYING INPUTS.
Final rept. 1 Oct 64-30 Sep 65,
by G. Herzog, J. Guarracini, and R. A. Powlus. Mar 66, 29p. Contract AF 19(628)-4387, Proj. AF-4641, Task 464104,
AFCRL 66-29

Unclassified report

Descriptors: (*Computers, Integrated circuits), (*Photoelectric effect, Computers), (*Integrated circuits, Computers), (*Optical equipment, Computers), Computer logic Transistors, Semiconductor devices, Oscillators, Punched cards, Photoelectric materials, Gates (Circuits), Semiconducting films, Diodes (Semiconductor), Cadmium compounds, Sulfides, Tellurides

A logic array of 128 MOS transistors was constructed that has the ability to operate as a half-adder, a ring oscillator with any odd number of stages up to 15, a group of coupled flip-flops or any one of many other special configurations. The desired logic network is specified by an optical radiation pattern determined by the holes punched in a standard business data card. Photoconductors sense the radiation and turn on MOS transistors that close the signal paths between MOS transistor-NOR gates. The logic performed therefore depends on which paths are closed between the various NOR gates. Insulated-gate field-effect transistors (IGFET) of the metal-oxide-semiconductor (MOS) variety were selected for this use because of the small amount of energy required to control their conduction. Experiments with thin-film versions of the IGFET indicate equivalent usefulness and the promise of large low-cost modifiable arrays of logic gates. (Author)

AD-630 030 Fld. 9/2
CFSTI Prices: HC $2.60 MF $0.50
ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB
AN IMPROVEMENT IN THE STATE AXIOMS,
by James A. Resh. Mar 66, 25p. Rept. no. R-282,
Contract DA-28-043-AMC-00073 (E), Proj. DA-200 14501B31F

Unclassified report

Descriptors: (*Input-output devices, Mathematical logic), Electrical networks

This report considers Zadeh's axiomatic formulation of the notion of state descriptions. It shows that, in addition to admitting system descriptions which would pass as state descriptions in the ordinary senses of the word, that definition also admits an extremely degenerate state description for any system. After discussing a number of the axioms' flaws, which are manifested by this degenerate description, a modification in the definition is proposed and defended. (Author)

AD-630 125 Fld. 9/2, 6/4, 9/4
CFSTI Prices: HC $9.60 MF $0.75
APPLIED DATA RESEARCH INC PRINCETON N J
COMMUNICATION WITH AUTOMATA.
Final rept. vol. 1, suppl. 1,
by Carl Adam Petri. Jan 66, 98p. Contract AF 30(602)-3324,
RADC TR-65-377-vol-1-suppl-1

Unclassified report

Translation by Clifford F. Greene, Jr. of Kommunikation mit Automaten, Bonn, 1962. See also AD-626 819.

Descriptors: (*Computers, Theory), (*Data processing systems, Theory), (*Automata, Theory), Information theory, Iterative methods, Recursive functions, Programming languages, Gates (Circuits), Switching circuits, Computer storage devices

The theory of automata is shown not capable of representing the actual physical flow of information in the solution of a recursive problem. The argument proceeds as follows: (1) The following postulates are assumed: (a) there exists an upper bound on the speed of signals; (b) there exists an upper bound on the density with which information can be stored. (2) Automata of fixed, finite size can recognize, at best, only iteratively defined classes of input sequences. (3) Recursively defined classes of input sequences that cannot be defined iteratively can be recognized only by automata of unbounded size. (4) in order for an automaton to solve a (soluble) recursive problem, the possibility must be granted that it can be extended unboundedly in whatever way might be required. (5) Automata (as actual hardware) formulated in accordance with automata theory will, after a finite number of extensions, conflict with at least one of the postulates. Suitable conceptual structures for an exact theory of communication are then discussed, and a theory of communication proposed.

AD-630 198 Fld. 9/2
CFSTI Prices: HC $4.00 MF $0.75
ANALOG/HYBRID COMPUTER LAB UNIV OF ARIZONA TUCSON
HYBRID COMPUTING SYSTEMS AND COMPONENTS.
A collection of papers,
by G. A. Korn, J. V. Wait, Robert L. T. Hampton, B. A. Mitchell, and Thomas A. Brubaker. Aug 63, 124p. Contract AF-AFOSR-89-63,
AFOSR 5235

Unclassified report

Descriptors: (*Analog-digital computers, Scientific research), Solid state physics, Digital-to-analog converters, Transistors, Waveform generators, Comparators, Computer storage devices, Pulse modulation, Noise generators, Analog computers

Contents: 1962 Progress and ASTRAC II project, by G. A. Korn, 20 Dec 62, ACL memo 59. A solid-state analog comparator for hybrid analog-digital comparators, by J. V. Wait and R. L. T. Hampton, 20 Jan 63, ACL memo 63R. A simple solid-state digital-to-analog converter for hybrid computing systems, by J. V. Wait and B. A. Mitchell, 10 Feb 63, ACL memo 61. An interpolation waveform generator for use in hybrid computing systems, by J. V. Wait, 11 Feb 63, ACL memo 64 (AD-416 386). Analog-hybrid storage and pulse modulation, by G. A. Korn, 30 Mar 63, ACL memo 67 (Trans. IEEE/PGEC, Aug 63). A hybrid/analog-digital one-parameter optimizer, by B. A. Mitchell, 8 Apr 63, ACL memo 69. Hybrid analog-digital random-noise generation, by R. Hampton, G. A. Korn, and B. Mitchell, Apr 63, ACL memo 71 (Trans. IEEE/PGEC, Aug 63). A nonsaturating transistor switch for analog/hybrid instrumentation and computers, by T. A. Brubaker, May 63, ACL memo 78. Simple integrator-input addition of hybrid variables, by E. P. O'Grady and J. V. Wait, Aug 63, ACL memo 82 (supplement to ACL memo 76).

AD-630 223 Fld. 9/2, 9/3
UNIVERSITY COLL CORK (EIRE)
A TRANSISTORIZED RATIO AMPLIFIER EMPLOYING THE PRINCIPLE OF ELAPSED TIME COMPUTATION,
by A. A. Cremin, and M. C. Sexton. 1965, 4p. Contract AF-EOAR-46-65,
AFOSR 66-0377

Unclassified report

Availability: Published in Electronic Engineering Nov 1965. Copies to DDC users only.

Descriptors: (*Transistor amplifiers, Analog computers), (*Analog computers, Transistor amplifiers), (*Circuits, Analog computers), (*Computer logic, Analog systems), Correlators, Sampling, Wiring diagrams, Electrical engineering

A description is given of ana analogue circuit suitable for obtaining the ratio of two time-varying input signals. The method involves the use of elapsed time (time-base) circuits to generate sampling frequencies considerably higher than the input signal frequencies thereby producing an essentially continuous output signal proportional to the input ratio. (Author)

AD-630 245 Fld. 9/2, 18/9
CFSTI Prices: HC $5.60 MF $0.50
DAVID TAYLOR MODEL BASIN WASHINGTON D C APPLIED MATHEMATICS LAB
A LARC MASTER CONTROL ROUTINE (MCR4),
by Sarah E. Kenady. Jan 66, 56p. Proj. S-R003-10-01,
DTMB 2125

Unclassified report

Descriptors: (*Digital computers, Programming (Computers)), (*Programming (Computers), Compilers), (*Compilers, Control sequences), Data processing systems, Reactor operations, Fuel burn up, Nuclear engineering

This report describes as operating system developed for code checking, data processing, and batch running of UNIVAC-LARC routines. It is a general purpose extension of the FLAME Master Control System described in Model Basin Report 1863 (AD-611 775). (Author)

AD-630 257 Fld. 9/2, 12/1
CFSTI Prices: HC $18.00 MF $1.00
MICHIGAN UNIV ANN ARBOR COMMUNICATION SCIENCES PROGRAM
ON SOME CATEGORICAL ALGEBRA ASPECTS OF AUTOMATA THEORY: THE CATEGORICAL PROPERTIES OF TRANSITION SYSTEMS.
Technical rept.,
by Yehoshafat Give'on. Feb 66, 184p. Rept. no. 03105-43-T,
Contract Nonr-1224(21),DA-ARO(D)-31-124-G665 Proj. ORA-03105 ,ORA-07363

Unclassified report

Descriptors: (*Mathematical logic, Automata), (*Automata, Mathematical logic), (*Algebra, Automata), Set theory, Monoids, Mapping (Transformations)

The ubiquity and usefulness of homomorphisms in various studies of automata lead us to consider the following problem. What can be said on automata by referring only to homomorphisms of automata. In the report we present a study of this problem with respect to a special type of automaton, namely, with respect to transition systems. Categorical algebra methods are applied to the precise formulation of this problem and to its solution. We find that if W is a monoid belonging to a broad class of monoids, then the categorical abstract properties of transition systems with input W, are determined by the automorphisms of the monoid W. In particular, any property of automata without output is categorical if it does not depend on the particular labeling of the input alphabet. This study of the categorical properties of automata has two additional outcomes. First, we realize that categorical algebra methods can be applied to automata with arbitrary input monoids, with results pertinent to the theory of monoids. On the other hand, it indicates a possible usefulness in the study of automata, in particular, in getting a better under-

standing of the mathematical ideas employed in automata theory. In order to support this point of view with respect to automata theory, we show that many actually studied properties of automata are categorical. And we give an example of a categorical examination and formulation of a particular study of perfect automata. (Author)

AD-630 282 Fld. 9/2
CFSTI Prices: HC $2.60 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
TRANSLATION OF PROGRAMS FROM ALGOL-60 LANGUAGE INTO LANGUAGES OF ELECTRONIC COMPUTERS. EXPERIMENT OF USING TRANSLATOR TA-2, CHAPTER III,
by P. M. Sosis. 4 Mar 66, 22p. Rept. no. FTD-TT-66-23,
TT 66-60814

Unclassified report

Unedited rough draft trans. of mono. Algoritmicheskii Yazyk Algo-60 i Primenenie ego v Stroitelnoi Mekhanike, Kiev, 1965 p112-23.

Descriptors: (*Compilers, USSR), Punched cards, Computer storage devices, Programming languages, Programming (Computers)

AD-630 389 Fld. 9/2, 20/8
CFSTI Prices: HC $3.00 MF $0.75
AIR FORCE WEAPONS LAB KIRTLAND AFB N MEX
PPA, A COMPUTER PROGRAM FOR PHOTO-PEAK ANALYSIS.
Rept. for Jul-Dec 65,
by Harry M. Murphy,Jr.. Mar 66, 57p. Rept. no. AFWL-TR-65-111,
Proj. AF-7807, Task 780716,

Unclassified report

Descriptors: (*Programming (Computers), Gamma-ray spectroscopy), (*Gamma-ray spectroscopy, Programming (Computers)), Statistical functions, Least squares method, Scintillation counters

PPA (Photo-Peak Analysis) is a simple FORTRAN computer code, that fits photo-peaks in pulse-height gammaray scintillation spectra, and gives results in terms that are immediately useful to the gamma-ray spectroscopist. PPA fits experimental data with a Gaussian (Normal) distribution function, containing a linear bias term through the use of an iterative, least-squares technique. As many as five photo-peaks can be fitted by PPA in any given experimental spectrum with the following results: (1) the exact channel location of the photo-peak; (2) the width of the photo-peak (FWHM); (3) the peak count rate; (4) the integrated photo-peak count rate and (5) the integrated photo-peak count rate corrected for radioactive decay to 'zero-time.' The mathematics involved in the analysis, the input data required, and the results of some experimental measurements, as well as some typical applications of the code are discussed. In addition, a complete FORTRAN listing with flow diagrams is given. (Author)

AD-630 424 Fld. 9/2, 12/1
CFSTI Prices: HC $1.00 MF $0.50
SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
BOUNDED REGULAR SETS.
Scientific rept.,
by Seymour Ginsburg, and Edwin H. Spanier. 12 Jan 66, 14p. Rept. no. Scientific-9,TM-738/024/00
Contract AF 19 (628)-5166, Proj. AF-5632, Task 563205,
AFCRL 66-127

Unclassified report

Prepared in cooperation with California Univ., Berkeley.

Descriptors: (*Set theory, Programming languages), (*Programming languages, Context free grammars), (*Context free grammars, Programming languages), Metamathematics, Algorithms

Two characterizations of bounded regular sets are given. In addition, certain bounded regular sets are related to their commutative closure. (Author)

AD-630 489 Fld. 9/2, 9/4
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
ONE-TAPE, OFF-LINE TURING MACHINE COMPUTATIONS,
by F. C. Hennie. 12 Jan 65, 26p. Contract DA-36-039-AMC-03200 (E) ,NSF-GP-2495

Unclassified report

Prepared in cooperation with NIH grant PHS-MH-0473704, NASA grant NsG-496. Prepared for presentation at the annual Symposium on Switching Circuit Theory and Logical Design (6th), Ann Arbor, Michigan, October 6-8, 1965.

Availability: Published in Information and control v8 n6 p553-78 Dec 1965. Copies to DDC users only.

Descriptors: (*Computers, Theory), Pattern recognition, Real time, Time, Magnetic tape, Set theory, Sequences, Binary arithmetic

The paper has two purposes. The first is to investigate the characteristics of a restricted class of Turing machines, and to develop a simple tool for describing their computations. The second is to present specific problems for which tight lower bounds can be found for the computation times required by Turing machines of this restricted class. (Author)

AD-629 782 **See Fld. 20/4**

AD-629 783 **See Fld. 20/4**

AD-629 789 **See Fld. 5/7**

AD-629 936 **See Fld. 17/9**

AD-629 976 **See Fld. 12/1**

AD-630 089 **See Fld. 5/2**

AD-630 127 **See Fld. 5/2**

AD-630 136 **See Fld. 9/5**

AD-630 146 **See Fld. 13/2**

AD-630 147 **See Fld. 6/5**

AD-630 150 **See Fld. 5/2**

AD-630 151 **See Fld. 5/2**

AD-630 152 **See Fld. 5/2**

AD-630 193 **See Fld. 17/9**

AD-630 300 **See Fld. 12/2**

AD-630 301 **See Fld. 17/2**

AD-630 304 **See Fld. 12/2**

AD-630 429 **See Fld. 5/10**

AD-630 439 **See Fld. 4/2**

AD-630 456 **See Fld. 20/10**

AD-630 471 **See Fld. 6/4**

9/3. ELECTRONIC AND ELECTRICAL ENGINEERNG

AD-629 781 Fld. 9/3, 9/1
CFSTI Prices: HC $3.00 MF $0.75
MINNESOTA UNIV MINNEAPOLIS ELECTRON TUBE RESEARCH LAB
NOISE MEASUREMENTS AS A TOOL IN ELECTRON DEVICE RESEARCH.
Quarterly progress rept. no. 11, 1 Jul-30 Sep 65,
by A. van der Ziel. 30 Sep 65, 67p. Rept. no. 23, Contract DA-36-039-AMC-00028 (E), Task DA-1P6-22001-A-055-02,

Unclassified report

Continuation of Contract DA-36-039-sc-85289.

Descriptors: (*Noise (Radio), Measurement), (*Electronic equipment, Noise (Radio)), Secondary emission, Vidicons, Image orthicons, Test equipment, Films, Cathodes (Electron tubes), Aluminum compounds, Oxides

Equipment is being assembled for pulse noise measurements in thin film structures, including thin film cathodes. Equipment is also being assembled for noise measurements in transmission secondary emission image intensifier tubes obtained from Westinghouse. Improved techniques for making better, or novel, secondary emission targets have been introduced. Secondary emission noise measurements indicate that eta - delta = var n sub c/<n sub c>, where n sub c is the number of secondaries produced by a given primary, varies as the square root of the primary energy over a rather wide primary energy range. There is therefore only a limited energy range for which var n sub c is congruent to (n sub c). Univac thin film Al203 diodes with about 20 angstrom oxide thickness show 1/f noise, varying as I sub a squared, at low frequencies and full shot noise at higher frequencies. There was no apparent space charge suppression of the noise. Screen noise measurements were performed on the highspeed screen of a 5BNP16 cathode ray tube. A circular scan was used to scan the screen and the light output was detected by a phototube. Both the resulting noise spectrum and the rms deviation from the mean photocurrent were measured. Interesting results were obtained that are not yet fully explained. (Author)

AD-630 264 Fld. 9/3
CFSTI Prices: HC $1.60 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
ON THE THRESHOLD OF GREAT DISCOVERIES,
by V. Siforov. 4 Mar 66, 11p. Rept. no. FTD-TT-66-46,
TT 66-60809

Unclassified report

Unedited rough draft trans. from Ekonomicheskaya Gazeta (USSR) 9 Jun p7 1965.

Descriptors: (*Radio equipment, Electronics), (*Electronics, Radio equipment), USSR, Scientific research

A popularized account of the application of radio electronics is presented.

AD-629 930 **See Fld. 9/1**

AD-630 038 **See Fld. 9/5**

AD-630 223 **See Fld. 9/2**

AD-630 474 **See Fld. 9/1**

9/4. INFORMATION THEORY

AD-629 934 Fld. 9/4
CFSTI Prices: HC $3.60 MF $0.50
LINCOLN LAB MASS INST OF TECH LEXINGTON
A METHOD FOR ESTIMATING THE PARAMETERS OF A STABLE DIFFERENCE EQUATION DRIVEN BY SINUSOIDS AND OBSERVED IN THE PRESENCE OF NONWHITE NOISE.
Technical note,
by Leland A. Gardner,Jr.. 11 Feb 66, 38p. Rept. no. TN-1966-9,

Contract AF 19 (628)-5167, Proj. AF-627A
ESD TDR-66-41

Unclassified report

Descriptors: (*Information theory, Difference equations), Mathematical models, Least squares method, Noise, Matrix algebra

AD-630 029 Fld. 9/4
CFSTI Prices: HC $2.60 MF $0.50
ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB
A THEOREM ON THE MINIMUM DISTANCE OF BCH CODES OVER GF (Q),
by Vincent Lum. Mar 66, 26p. Rept. no. R-281, Contract DA-28-043-AMC-00073 (E),NSF-GK-690 Proj. DA-20014501B31F

Unclassified report

Descriptors: (*Theorems, Coding), (*Coding, Theorems), Numerical analysis, Sequences, Polynomials, Recursive functions

This paper presents a generalization of Mattson-Solomon method for finding the minimum distance of a class of BCH codes. The theorem derived makes it possible to determine fairly easily if a particular code over GF (q) satisfies the conditions set forth and hence has minimum distance exceeding the BCH bound. Application of the theorem is given and numerous examples are presented. (Author)

AD-630 336 Fld. 9/4, 5/7, 5/10
CFSTI Prices: HC $7.90 MF $2.25
HASKINS LABS NEW YORK
SPEECH RESEARCH AND INSTRUMENTATION.
Final rept. no. 11, 2 Sep 62-31 Oct 64. 5 Mar 65, 490p.

Unclassified report

Descriptors: (*Speech, Scientific research), (*Phonetics, Scientific research), Linguistics, Language, Acoustic properties, English language, Instrumentation, Digital computers, Sound pitch, Acoustics, Digital systems

Most of the basic research presented can be divided into three major areas: (1) further studies of the acoustic features that carry speech intelligibility, (2) investigations of articulatory gestures that give rise to the acoustic cues, and (3) the development of instrumentation to make such research possible. All the work is presented as a series of articles and papers each of which is signed by the staff members who bore the primary responsibility for that aspect of the research.

AD-630 340 Fld. 9/4, 20/14
CFSTI Prices: HC $5.00 MF $1.00
LOWELL TECHNOLOGICAL INST RESEARCH FOUNDATION MASS
RESEARCH DIRECTED TOWARD PATTERN RECOGNITION CAPABILITIES OF WAVE PROCESSES IN ACTIVE ISOTROPIC PROPAGATING MEDIA.
Final rept., 1 Feb 63-31 Jan 66,
by David G. Mello, and George J. English. Jan 66, 156p. Contract AF 19 (628)-2485, Proj. AF-4645, Task 464503,
AFCRL 66-90

Unclassified report

Rept. includes Appendix A, Corner and Curvature Discrimination Properties of a Circular Aperture, by George J. English, Scientific rept. no. 1.

Descriptors: (*Pattern recognition, Wave transmission), (*Wave transmission, Pattern recognition), (*Information theory, Pattern recognition), Signals, Wave functions, Wave analyzers, Optical equipment, Electronic equipment, Analog systems, Data processing systems, Electromagnetic waves, Propagation

The purpose of the research reported here was to show experimentally and prove mathematically the nature of H. Blum's hypothesis of signal propagation and abstract transformation. Two machines were developed to transform signals from parallel-spatial input to sequential-temporal output. The first of these was an optical device; the second, and electronic analog of the first, incorporating an internal signal processor. Concurrent mathematical studies provided formal proof of the consitency of such a process. (Author)

AD-630 374 Fld. 9/4, 9/5
LINCOLN LAB MASS INST OF TECH LEXINGTON
OPTIMUM RATE ALLOCATION FOR ENCODING SETS OF ANALOG MESSAGES,
by L. M. Goodman. 3 Aug 65, 2p. Rept. no. JA-2650,
Contract AF 19 (628)-5167,
ESD TDR-66-40

Unclassified report

Availability: Published in Proceedings of the IEEE v53 n11 p1776-7 Nov 1965. Copies to DDC users only.

Descriptors: (*Information theory, Analog-to-digital converters), (*Analog-to-digital converters, Information theory), Digital systems, Data transmission systems, Scheduling, Coding, Optimization

For the optimum encoding of white band-limited Gaussian signals, equations are derived for the distribution of rates resulting in minimum total mean-square error; and an equation for the resulting error, which serves as a lower bound for all encoding schemes, is derived. In addition, several practical suboptimum encoding schemes, consisting of sampling and then quantizing in an optimum fashion, are considered. Asymptotic expressions are derived for the optimum allocation of rates and number of quantization levels per message for the case in which the number of individual quantization levels is large. An asymptotic expression for the resulting error for these schemes is also given.

AD-630 380 Fld. 9/4
CORNELL UNIV ITHACA N Y
CHANNELS WITH ARBITRARILY VARYING CHANNEL PROBABILITY FUNCTIONS,
by J. Kiefer, and J. Wolfowitz. 9 Oct 61, 12p.
Contract AF 49 (638)-226,
AFOSR 3324

Unclassified report

Availability: Published in Information and Control v5 n1 p44-54 Mar 1962. Copies to DDC users only.

Descriptors: (*Information theory, Statistical functions), Data transmission systems, Probability, Coding

AD-630 428 Fld. 9/4, 5/10
CFSTI Prices: HC $3.00 MF $0.75
SPERRY RAND RESEARCH CENTER SUDBURY MASS
PERFORMANCE EVALUATION OF SPEECH PROCESSING DEVICES. II. THE ROLE OF INDIVIDUAL DIFFERENCES.
Scientific rept. for 1 Mar-30 Nov 65,
by William D. Voiers. Dec 65, 66p. Rept. no. SRRC-RR-65-115,
Contract AF 19 (628)-4987 Proj. AF-4610, Task 461002,
AFCRL 66-24

Unclassified report

Descriptors: (*Speech recognition, Scientific research), (*Speech, Scientific research), (*Voice communication systems, Scientific research), Acoustic properties, Physical properties, Factor analysis, Analysis of variance

The report treats three topics related to the phenomenon of individual differences in speech: (1) the effect upon speech intelligibility of the listener's familiarity with the speaker's voice; (2) the nature and number of elementary ways, or PAT's (perceived acoustic traits) in which voices are perceived to differ from each other; (3) the physical bases of perceived acoustic traits. Speech intelligibility as measured by the Diagnostic Rhyme Test was unaffected by the degree of the listener's familiarity with the speaker's voice, where the basis of faimiliarity was a maximum of three presentations of a two-minute sample of prose. A voice rating experiment, involving both mono-polar and bi-polar ratings scales failed to reveal any previously unidentified PAT's. A factor analysis of 22 physical and perceptual voice variables yielded results to indicate that the physical correlates of some PAT's may be qualitatively shifted under certain conditions of stimulus impoverishment. The physical bases of the PAT's, Pitch-Magnitude and Animation-Rate appear to be relatively stable under various conditions of stimulus impoverishment, but the physical bases of Loudness-Roughness and Clarity-Beauty may be drastically altered by frequency distortion and vocoderization. (Author)

AD-630 465 Fld. 9/4, 9/5, 17/2.1
CFSTI Prices: HC $2.00 MF $0.50
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS ANTENNA LAB
PHASE ERROR ANALYSIS FOR AN ACTIVE ARRAY SYSTEM.
Interim rept.,
by Charles H. Brenner. Mar 66, 38p. Rept. no. 1963-3,
Contract AF 30 (602)-3601, Proj. AF-4519, Task 451901,
RADC TR-65-232-Vol-3

Unclassified report

Descriptors: (*Antenna arrays, Active), (*Phase control devices, Antenna arrays), (*Phase-locked communication systems, *Information theory), Phased arrays, X band, Parabolic antennas, Radar antennas, Radio signals, Radar signals, Reflectors, Satellites (Artificial), Electromagnetic wave reflections, Propagation, Mathematical analysis

An active (transmitting and receiving) array operating at X-band using four 30-foot parabolic antennas is discussed. The active array system is designed to operate with both active and passive orbiting satellites as a target. Phasing information received from the target is used to control the phases of the transmitted signals such that they add coherently at the satellite. Thus the active array operates as a servo system with an inherent time delay equal to twice the propagation time delay from the satellite to the ground station. The optimum transfer function for the active array system, including the effects of this time delay, is determined for various input signals by using a Weiner-Hopf optimization technique. Performance of the system is evaluated for both deterministic and stochastic input signals. Various deterministic input signals are used to calculate the optimum transfer function. Then the mean square error (MSE) and integral square error (ISE) are evaluated for various combinations of deterministic inputs and transfer functions. Seven different power density spectra (PDS) are used to represent the stochastic input signals. (Author)

AD-630 494 Fld. 9/4
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
A COMPARISON OF OPTIMUM ANGLE MODULATION SYSTEMS AND RATE-DISTORTION BOUNDS,
by H. L. Van Trees. 1 Oct 65, 2p. Contract DA-36-039-AMC-03200 (E) ,NSF-GP-2495

Unclassified report

Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering.

Availability: Published in Proceedings of the IEEE v53 n12 p2123-4 Dec 1965. Copies to DDC users only.

Descriptors: (*Information theory, Phase modulation), Demodulation, Analog systems, Optimization, Data transmission systems

The purpose is to point out an interesting comparison between two results in the area of analog message transmission. The first result concerns the design and performance of an optimum angle modulation system. The second result concerns a bound on the mean-square distortion error derived using the rate-distortion function of a continuous message source. The point of interest is that, except for a constant, the mathematical expressions obtained using these two diverse approaches are identical. (Author)

AD-629 766 See Fld. 9/2

AD-629 968 See Fld. 12/1

AD-630 025 See Fld. 6/16

AD-630 125 See Fld. 9/2

AD-630 271 See Fld. 17/2

AD-630 301 See Fld. 17/2

AD-630 489 See Fld. 9/2

AD-630 496 See Fld. 17/2

9/5. SUBSYSTEMS

AD-629 905 Fld. 9/5, 20/5, 20/9
CFSTI Prices: HC $2.00 MF $0.50
AIR FORCE WEAPONS LAB KIRTLAND AFB N MEX
INVESTIGATION OF A LASER TRIGGERED SPARK GAP.
Technical rept. for Jan 64-Dec 65,
by Arthur H. Guenther, and Winston K. Pendleton. Mar 66, 27p. Rept. no. AFWL-TR-65-32, Proj. AF-5710, Task 08.011,
Unclassified report

Prepared in cooperation with Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

Descriptors: (*Lasers, Electronic switches), (*Electronic switches, Lasers), (*Gas ionization, Lasers, Voltage, Trigger circuits, Switching circuits, Electrodes, Gases, Sparks, Electric currents

The influence of parameters affecting the laser triggering of a high-voltage electrical sphere-sphere gap has been experimentally investigated. Of primary interest was the delay time between arrival of the laser pulse and current flow across the gap. This delay was studied as a function of total laser beam power (0-80 MW); dielectric gas (SF6,N2,air); gas pressure (100-1400 Torr); electrode spacing (0.4-1.5 cm); gap electric field (10-100kV/cm); and focus point location between two 5 cm diam stainless steel spheres. Delay times less than 10 nsec were observed in SF6 at atmospheric pressure with corresponding low jitter. For the cases studied delay times varied inversely with the electric field, gas pressure, and focus point distance from the anode surface. Above a certain laser beam power the delay time was not a significant function of laser power for the range studied. Applications of laser triggering are discussed with a description of current and future research areas. (Author)

AD-629 950 Fld. 9/5, 9/1
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF RADIO AND ELECTRICAL ENGINEERING
THE DEVELOPMENT AND PERFORMANCE OF CURRENT COMPARATORS FOR AUDIO FREQUENCIES,
by N. L. Kusters, and W. J. M. Moore. 28 Jun 65, 14p.
Unclassified report

Availability: Published in IEEE Transactions on Instrumentation and Measurement vIM-14 n4 p178-90 Dec 1965. Copies to DDC users only.

Descriptors: (*Comparators, Electric currents), (*Audiofrequency, Comparators), Design, Calibration, Electromagnetic shielding, Performance (Engineering), Errors, Test methods, Wiring diagrams, Canada

The design and construction of five different multiratio current comparators developed for use at audio frequencies is presented. The effectiveness of the various shields on the reduction of the current null detector error over the operating frequency range is shown. Equations are developed which illustrate the effect of several different arrangements of windings and grounded shields on the ratio winding error. All of the comparators are of the compensated type and each is rated at a secondary current of five amperes. Four have fixed primary windings which can be series-paralleled to obtain various ratios from 1 to s to 12 to 1. The fifth comparator is a feed-through type with a 100 turn secondary winding which provides ratios up to 100 to 1. Circuits are described which enable the calibration of these comparators to be performed, and the results of calibration at frequencies up to 16 kHz are given. A method of estimating the error at different ratios to within a part in a million, based on experimentally determined parameters and assumed uniform distribution, is also described. The main conclusion of the study is that for current transformer calibration the best design includes a grounded copper shield between the primary and secondary windings. (Author)

AD-630 038 Fld. 9/5, 20/12, 9/3
CFSTI Prices: HC $2.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
GATE RING COUNTERS AND THEIR POSSIBLE ADVANTAGES IN LOW POWER MICROELECTRONIC SYSTEMS.
Technical memo.,
by George J. Veth. Nov 65, 32p. Rept. no. TG-741,
Contract NOw-62-0604-c, Proj. A35,
Unclassified report

Descriptors: (*Scalers, Gates (Circuits)), (*Gates (Circuits), Scalers), (*Microminiaturization (Electronics), Scalers), Semiconductor devices, Cascade structures, Rings, Integrated circuits, Counting methods, Binary arithmetic, Computer logic

Cascade and ring counters are frequently found in microelectronic systems because binary counter stages composed of flip-flops having appropriate pulse steering networks have been easily realized in semiconductor microelectronic form. Other arrangements, however, are superior in flexibility and power dissipation, but they are not realizable in semiconductor microelectronic form because of present limitations in semiconductor microelectronic fabrication capabilities. Gate ring counters are realizable, though, and they offer capabilities not available with cascade and ring counters. Nor and nand gate ring counters are discussed and compared with cascade and ring counters employing binary counter stages. (Author)

AD-630 049 Fld. 9/5, 20/9, 20/14
CFSTI Prices: HC $2.00 MF $0.50
SPERRY GYROSCOPE CO GREAT NECK N Y RADIATION DIV
ECM AEROSPACE ANTENNA STUDIES, VOLUME 2 OF 2.
Quarterly technical rept. no. 1,
by Gerald Meltz, Richard Kristal, and Peter Shizume. Dec 65, 31p. Rept. no. rd-5291-0680-Vol-2,
Contract AF 19 (628)-5531,ARPA Order-693 Proj. AF-8671,
AFCRL 65-865-Vol-2
Unclassified report

Descriptors: (*Antennas, Atmosphere entry), (*Plasma medium, Antennas), (*Simulation, Atmosphere entry), Reentry vehicles, Antenna radiation patterns, Electrical impedance, Theory, Simulators

The report covers the first quarter of work on Volume II. Volume II includes the work done under Task III, Re-Entry Plasma Simulations, and Task IV, Analytical Plasma Calculations. The purpose of Task III is to develop a laboratory simulation of the re-entry plasma about scale models of re-entry vehicles carrying antennas and to make measurements of antenna pattern distortion and attenuation for various conditions of the plasma. This report covers the construction of parts of the simulator during the first quarter. The purpose of Task IV is to develop analytic techniques based on approximate boundry conditions for describing pattern distortion for antennas mounted on conical re-entry vehicles, and to develop methods for calculating the terminal impedance of plasma antennas. Calculations of the terminal admittance of a plasma coated slotted cylinder are given in this report for the case of a lossless plasma layer as a function to layer thickness and dielectric constant. The admittance is also calculated for a long plasma layer as a function of (omega sub p/omega, upsilon7/omega ! 0.1) and for various frequencies and layer thickness. The theoretical results are compared against experimentally determined values and are shown to compare favorably. (Author)

AD-630 091 Fld. 9/5, 14/2, 4/1
CFSTI Prices: HC $7.60 MF $0.75
STANFORD RESEARCH INST MENLO PARK CALIF
THE LOGARITHMICALLY PERIODIC RHOMBIC ANTENNA.
Research memo.,
by Frank B. Harris,Jr.. Apr 62, 72p. Rept. no. RM-8,
Contract DA-36-039-sc-87197, Proj. SRI-3670,
Unclassified report

Descriptors: (*Antenna arrays, Log periodic antennas), (*Log periodic antennas, Antenna arrays), (*Atmospheric sounding, Antenna arrays), Theory, Mathematical analysis, Antenna lobes, Gain, Antenna radiation patterns, Design, Models (Simulations), Ionosphere

The possibility of using a logarithmically periodic, concentric, rhombic antenna array for ionospheric sounding in the HF region is considered, both theoretically and experimentally. In particular, the feasibility of simultaneous excitation of n elements within a larger, m-element array is examined in detail. For a logarithmically periodic array, the group of any n neighboring elements forms a module whose properties are identical with those of any other similar module, except for a scale factor in frequency. A mathematical representation is developed which describes the behavior of such an n-element module independently of rhombic angle and height-to-leg length ratio. The important parameters of the calculation are the number and relative sizes of the elements within the module. It is shown, on the basis of the theory, that a module of three elements having a size ratio of 1.5 to 1 between successive elements should give a considerably lower side -lobe level over a larger frequency range than is typical of the single-element rhombic antenna. A design procedure is described for arrays intended for operation over large frequency ranges. This procedure is applied to a specific case, leading to a five-element, three-module array for operation over the range 4-36 Mc. The results of radiation pattern measurements on two different antenna models are presented. (Author)

AD-630 093 Fld. 9/5
CFSTI Prices: HC $3.00 MF $0.50
STANFORD RESEARCH INST MENLO PARK CALIF

APERATURE BLOCKING OF THE HIGH-FREQUENCY LUNEBERG LENS BY A SEMICIRCULAR GRATING OF MONOPOLE FEEDS.
Research memo.,
by Terry S. Cory. Aug 63, 55p. Rept. no. RM-10,
Contract DA-36-039-sc-87197, Proj. SRI-3670,

Unclassified report

Descriptors: (*Luneberg lens antennas, Antenna feeds), (*Antenna feeds, Luneberg lens antennas), Antenna aperature, Antenna radiation patterns, Theory, Experimental data, Optical properties, Mathematical analysis

The wire-mesh high-frequency modified Luneberg lens has numerous possibilities of application, among which are direction finding and azimuthal scanning with step-frequency ionospheric sounders. In these applications, where close feed spacing is desirable, numerous questions arise regarding the effect of the placement of feeds in the antenna aperture upon the lens radiation pattern in the absence of feeds. This paper describes an initial attempt to answer some of these questions. A geometrical configuration of feeds equally spaced around the periphery of the lens and the perturbing effect of this feed 'grating' upon the lens radiation pattern without the feeds is considered.

AD-630 136 Fld. 9/5, 9/2
CFSTI Prices: HC $2.60 MF $0.50
KENTUCKY UNIV LEXINGTON DEPT OF ELECTRICAL ENGINEERING
LINEAR NETWORK SENSITIVITY MINIMIZATION PROCEDURE.
Scientific rept.,
by D. A. Calahan. 1 Feb 66, 23p. Contract AF-AFOSR-948-65, Proj. AF-9749, Task 974901, AFOSR 65-1931

Unclassified report

Descriptors: (*Electrical networks, Optimization), Programming (Computers), Linear systems, Filters (Electromagnetic wave)

AD-630 280 Fld. 9/5
CFSTI Prices: HC $1.00 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
RAPID-ACTION SWITCH FOR 30-CENTIMETER WAVE,
by A. F. Bachurin. 3 Mar 66, 23p. Rept. no. FTD-TT-65-1305,
TT 66-60812

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Krymskaya Astrofizicheskaya Observatoriya. Izvestiya, v32 p187-91 1964.

Descriptors: (*Electronic switches, Microwave frequency), (*Microwave equipment, Electronic switches), (*Modulators, Microwave frequency), Resonators, Coupling circuits, Resonant frequency, USSR

A model mechanical double-pole switch on coupled resonators is described and its characteristics given. The switch can be used as a modulator in radiometers. (Author)

AD-630 472 Fld. 9/5, 17/2.1
CFSTI Prices: HC $2.00 MF $0.50
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS ANTENNA LAB
ACTIVE ARRAY TECHNIQUE.
Interim rept.,
by C. H. Brenner, and J. E. Tourdot. Feb 66, 31p. Rept. no. 1963-2,
Contract AF 30 (602)-3601, Proj. AF-4519, Task 451901,
RADC 65-232-Vol-1

Unclassified report

Descriptors: (*Phased arrays, Phase control devices), (*Adaptive communication systems, Phased arrays), Phase (Electronics), Phase-locked communication systems, Radio transmission, Communication satellites (Passive)

Two possible means of accomplishing phase coherence of signals at some point in space are discussed. These signals are radiated from separate transmitters of an array. The methods discussed are 'beam tagging' and 'phase conjugation.' These methods are discussed as to implementation and their advantages and disadvantages presented. The discussion is aimed at describing the way an array may be used in a satellite communications link. (Author)

AD-630 500 Fld. 9/5, 12/1
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
PASSIVITY CONDITIONS.
Revised ed.,
by Paul Penfield,Jr.. 8 Feb 65, 2p. Contract DA-36-039-AMC-03200 (E),

Unclassified report

Revision of manuscript submitted 21 Mar 64.

Availability: Published in IEEE Transactions on Circuit Theory vCT12 n3 p446-8 Sep 1965. Copies to DDC users only.

Descriptors: (*Electrical networks, Matrix algebra), (*Matrix algebra, Electrical networks), S-matrix, Tests

AD-629 878 **See Fld. 20/14**

AD-629 890 **See Fld. 9/1**

AD-629 892 **See Fld. 17/9**

AD-629 916 **See Fld. 20/14**

AD-629 953 **See Fld. 12/1**

AD-630 022 **See Fld. 9/2**

AD-630 239 **See Fld. 18/4**

AD-630 374 **See Fld. 9/4**

AD-630 465 **See Fld. 9/4**

AD-630 473 **See Fld. 17/2**

9/6. TELEMETRY

AD-629 889 Fld. 9/6, 20/3
CFSTI Prices: HC $2.00 MF $0.50
ELECTRONIC DEFENSE LABS SYLVANIA ELECTRONIC SYSTEMS-WEST MOUNTAIN VIEW CALIF
APPLICATION OF PRE-DETECTION AND RECORDING TECHNIQUES TO DATA COLLECTION SYSTEMS.
Technical memo.,
by Ray D. Lucas. 30 Nov 65, 40p. Rept. no. EDL-M859,
Contract DA-28-043-AMC-00379 (E),

Unclassified report

Descriptors: (*Telemetering data, Detection), (*Detection, Recording systems), Modulation, Phase shift, Amplitude modulation, Pulse modulation, Frequency shift, Phase shift, Telemetering receivers, Telemetering transmitters, Magnetic tape, Frequency shift keyers, Single sideband communication systems, Automatic frequency control, Automatic gain control, Intermediate frequency

The report evaluates pre-detection recording techniques for uncooperative signal acquisition with particular emphasis on the problems associated with wide band, wide dynamic range AM signals. Since the pre-detection recording process is placed in series, between the IF amplifier and the data processing circuits, new sources of noise and distortion are introduced. One of the basic problems is to identify the sources of signal degradation in the pre-detection process. The influence of receiver characteristics on the pre-detection recording process is discussed in Section 3. In Section 4, several techniques for down-conversion of IF signals to a center frequency compatible with a wideband tape recorder are discussed. Section 5 discusses tape recording techniques and Section 6 reviews the relative merits of several up-conversion schemes. The specific problems associated with pre-detection recording of AM signals are discussed in Section 7. Appendix A develops a scheme for a broadband 90-degree phase shifter which is of considerable value to the up-conversion problem, and gives the test results of a breadboard of the phase shifter. Appendix B gives the test results on a commercially available down-converter. Appendix C, written by L. N. Ferguson, discusses the 'care and feeding' of wide band tape recorders.

Field 10-ENERGY CONVERSION (NON-PROPULSIVE)

10/1. CONVERSION TECHNIQUES

AD-630 394 **See Fld. 9/1**

10/2. POWER SOURCES

AD-629 762 Fld. 10/2
CFSTI Prices: HC $3.00 MF $0.75
RADIO CORP OF AMERICA LANCASTER PA DIRECT ENERGY CONVERSION DEPT
THE DEVELOPMENT OF A FLAME FIRED THERMIONIC GENERATOR.
Interim technical rept. no. 1, 15 Mar-15 Oct 65. 15 Oct 65, 76p. Contract DA-44-009-AMC-998 (T),
ERDL 998T-1

Unclassified report

Descriptors: (*Thermionic converters, Feasibility studies), (*Fuels, Thermionic converters), (*Generators, Thermionic converters), Pipes, Heaters, Flames, Heat transfer, Heat exchangers, Electrical equipment

The report covers a seven month program to investigate components for flame fired thermionic energy conversion systems. The objective of the program is to demonstrate the feasibility of integrating a thermionic converter with a barrier layer and a heat pipe to obtain 1500 hour reliability of the assembly. A basic subassembly was designed to deliver 100 electrical watts from the thermal energy of a fossil fuel flame operating in an air environment. Twelve of these units would be used in the one kilowatt power module. Problems of heat transfer, permeation barrier integration, heat pipe processing and closure and burner temperature uniformity were encountered and substantially reduced or eliminated. The separate components were evaluated and determined to be satisfactory. It still remains to evaluate the complete assembly by life testing from a fossil fuel flame for a period up to 1500 hours. (Author)

AD-630 041 Fld. 10/2
CFSTI Prices: HC $1.10 MF $0.50
MINNESOTA MINING AND MFG CO ST PAUL
300 WATT PORTABLE THERMOELECTRIC GENERATOR.
Monthly progress rept. no. 12, 28 Feb 66,
by T. L. Nystrom. 28 Feb 66, 5p. Contract N600 (61533)62758,

Unclassified report

See also AD-621 350.

Descriptors: (*Thermoelectricity, Power

supplies), (*Generators, Thermoelectricity), (*Electric power production, Thermoelectricity), Portable, Thermocouples, Energy conversion, Hermetic seals, Performance (Engineering)

A complete generator system was assembled and tested. Test results demonstrate that the basic design is sound in that all system components function properly. The test results show: the hermetic seal lacks the required reliability; the system, excluding fuel, is 3 pounds too heavy; and the fuel consumption is 15% too high to meet the requirements of 35 pounds system weight including fuel for 8 hours for operation.

AD-630 171 Fld. 10/2, 13/10
CFSTI Prices: HC $1.10 MF $0.50
WESTINGHOUSE ELECTRIC CORP LIMA OHIO AEROSPACE ELECTRICAL DIV
100 WATT THERMOELECTRIC POWER SYSTEM FOR BUOY APPLICATIONS.
Monthly progress rept. no. 21, 11 Feb-11 Mar 66, by Dale A. Naumer. 11 Mar 66, 3p. Contract N600 (61533)61992,
Unclassified report

See also AD-629 006.

Descriptors: (*Theromoelectricity, Buoys), (*Buoys, Power supplies), Electric power production, Thermocouples, Generators, Markers lights, Tests

The first thermoelectric generator was disassembled, the trouble areas defined and corrected. The investigation of the electrical short to ground showed that several pieces of the mica on the hot core had failed in tension allowing the hot straps on the high temperature thermopile to ground to the core. Further investigation indicated that moisture in the MIN-K 2000 had severely oxidized the interior parts and would have caused additional problems. Three pieces of phlogopite mica will be used on the hot core. The two pieces (.002 inches thick each) closest to the hot core will be split to allow slippage. The total thickness of mica on the hot core is now .008 inches. To prevent further contamination by entrapped water in the MIN-K 2000 a processing cycle has been developed (see Appendix). Prior to welding the end pieces to the generator, the assembly will be pumped down to 1x10 to the minus 6th power torr at 300F for a minimum of 4 hours while monitoring with a residual gas analyzer (CEC Model 614 with a sensitivity of 5x10 to the minus 11th power torr/division to nitrogen) to insure that no further outgassing of O2 and H2O is occurring. The assembly will then be finish welded and leak tested in an argon atmosphere.

AD-630 285 Fld. 10/2, 13/10
CFSTI Prices: HC $4.00 MF $0.75
DEPARTMENT OF THE NAVY WASHINGTON D C
NEW SOURCES OF ELECTRICAL ENERGY FOR SHIPS,
by A. P. Baranov. 1966, 122p. Rept. no. Translation-2068,
TT 66-60817
Unclassified report

Novye Istochniki Elektricheskoi Energii dlya Sudov, trans. of mono. Sudostroenie, Leningrad, 1965.

Descriptors: (*Ships, Electric power production), (*Generators, Shipborne), Magnetohydrodynamic generators, Fuel cells, Thermionic converters, USSR, Chemical reactions

Contents: Thermoelectric generators, Thermoemission generators, Magnetohydrodynamic generators, Electrochemical generators (fuel cells).

Field 11-MATERIALS

11/2. CERAMICS, REFRACTORIES, AND GLASSES

AD-629 776 Fld. 11/2, 7/4
CFSTI Prices: HC $4.00 MF $0.75
SYSTEMS RESEARCH LABS INC DAYTON OHIO
THE ELECTRICAL BEHAVIOR OF REFRACTORY OXIDES III.
Final technical rept., 15 Feb 64-1 Jun 65, by Robert W. Vest, Julian A. Crawford, and Walter C. Tripp. Dec 65, 111p. Contract AF 33 (657)-10815, Proj. AF-7021, ARL 65-259
Unclassified report

Descriptors: (*Zirconium compounds, Oxides), (*Yttrium compounds, Oxides), (*Oxides, Electrical properties), (*Electrical properties, Ceramic materials), Mass transfer, Transport properties, Crystal lattice defects, Electrical conductance, Phase studies, Luminescence, Electron microscopy

The research was directed toward achieving a more fundamental understanding of charge and mass transport mechanisms in refractory metal oxides. Special research apparatus and instrumentation was developed in order to carry out the experimental program. The defect structure of tetragonal ZrO2 was studied by investigating the conductivity, transference number and the monoclinictetragonal phase change. Measurements of electrical conductivity and thermoluminescence of Y2O3 are presented. The results of thermogravimetric studies and electron microscopy work are also presented. (Author)

AD-629 942 Fld. 11/2, 9/1
CFSTI Prices: HC $3.00 MF $0.75
STANFORD RESEARCH INST MENLO PARK CALIF
RESEARCH ON DIELECTRICS FOR MICROWAVE ELECTRON DEVICES.
Rept. no. 13, 1 Oct 64-31 Oct 65 (Final), by L. Feinstein, J. Bordeaux, D. Peters, and C. Peltzer. Feb 66, 93p. Rept. no. FMU-5195, Contract DA-28-043-AMC-00215 (E),ARPA Order-318-62 Proj. OS-7900.21.223.15.00,
Unclassified report

Continuation of Contract DA-36-039-sc-90856.

Descriptors: (*Dielectrics, Microwave equipment), (*Microwave equipment, Dielectrics), (*Ceramic materials, Dielectrics), Aluminum compounds, Oxides, Dielectric films, Waveguide windows, Electron bombardment, Transport properties, Electrical conductance, Optical properties, Absorption, Electron tubes, Sapphire, Impurties

High purity, vacuum sintered polycrystalline aluminum oxide was fabricated. This material is transparent and has a density that is 99.5% of theoretical. Further measurements of the properties of aluminum oxide show its actual high temperature electrical conductivity to be about five orders of magnitude less than previously reported. This discrepancy is due to conductivity of ionized gases surrounding the specimen and electron emission of electrodes. Space-charge-limited current studies of sapphire indicate the existence of trapping centers at 2.5 ev below the conduction band, which is probably due to impurity levels. Studies indicate that the properties of aluminum oxide are not sensitive to effects of radiation. Optical absorption studies lead to the conclusion that the bandgap of aluminum oxide is about 8.5 ev. The breakdown strength of polycrystalline aluminum oxide with glassy phase is similar to that of bent single crystal specimens, i.e., less than that of the single crystal material. Electron bombardment of single and polycrystalline materials produces the same type of response, which is relatively independent of the morphology of the dielectric. Internal polarization due to heterogeneous charge distribution can be generated by electron bombardment.

AD-630 135 Fld. 11/2
CFSTI Prices: HC $1.00 MF $0.50
ARMY NATICK LABS MASS PIONEERING RESEARCH DIV
THERMAL CONDUCTIVITY OF PYREX GLASS: SELECTED VALUES.
Technical rept.,
by Lois C. K. Carwile, and Harold J. Hoge. Mar 66, 18p. Rept. no. TR-66-14-PR,Thermal Conductivity-1
Proj. DA-1P014501B11A,
Unclassified report

Descriptors: (*Heat-resistant glass, Thermal conductivity), (*Thermal conductivity, Heat-resistant glass), Heat transfer, Transport properties, temperature, Calibration, Equipment, Corrections, State-of-theart reviews

The published literature on the thermal conductivity of Pyrex glass has been assembled and the results critically evaluated. Best values of thermal conductivity as a function of temperature were selected. These are presented in both graphical and tabular form; they cover the range 50 to 850K. An attempt was made to consult all work that could significantly affect the choice of best values. Published papers were located with the aid of Chemical Abstracts, Physics Abstracts, the Thermophysical Properties Retrieval Guide, and some other general sources. In addition, relevant references in the papers themselves were followed up until a substantially 'closed system' had been generated, as shown by the fact that no new references were being turned up. (Author)

AD-630 160 Fld. 11/2, 20/13, 20/12
SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY RAPID CITY DEPT OF PHYSICS
THE THERMAL CONDUCTIVITY OF SOME SODIUM TUNGSTEN BRONZES,
Technical rept.,
by H. R. Shanks, and R. D. Redin. 12 Jul 65, 5p. Rept. no. TR-16,
Contract Nonr-2964 (01),
Unclassified report

Availability: Published in The Journal of Physics and Chemistry of Solids v27 p75-8 1966. Copies to DDC users only.

Descriptors: (*Ceramic materials, Thermal conductivity), (*Sodium compounds, Ceramic materials), (*Tungsten compounds, Ceramic materials), Metallic crystals, Single crystals, Solid state physics, Transport properties, Oxides

The thermal conductivity of two cubic sodium tungsten bronze samples (Na sub x WO3) with x-values of 0.513 and 0.804 were measured between 350 and 800K. The measurements were made by a series comparative method using Armco iron as the standard. The thermal conductivity of both samples was found to increase with increasing temperature and to have a discontinuity between 400 and 500K. The positive temperature coefficients are interpreted as a combination of electron and phonon conduction limited by impurity scattering. (Author)

AD-629 908 See Fld. 13/8

AD-630 013 See Fld. 20/12

AD-630 070 See Fld. 11/6

AD-630 364 See Fld. 20/12

AD-630 469 See Fld. 22/2

11/3. COATINGS, COLORANTS, AND FINISHES

AD-629 862 Fld. 11/3, 13/8
CFSTI Prices: HC $1.00 MF $0.50
DEPARTMENT OF THE NAVY WASHINGTON D C

SILICATE PAINTS MANUFACTURED,
by B. Zhukov, and A. Samburskii. 1966, 7p.
Rept. no. Translation-2056,
TT 66-60754

Unclassified report

Silikatnye Kraski - v Proizvodstvo, trans. of Stroitelstvo i Arkhitektura Srednei Azii, n5 p32-4 1964.

Descriptors: (*Silicates, Paints), (*Paints, Manufacturing methods), Pigments, Talc, Zinc compounds, Oxides, Physical properties, USSR

Silicate paints are a suspension of mineral alkali-resistant pigments and fillers in liquid potassium silicate. The pigment mixture is produced in two types: type 'A', for application to exteriors, and type 'B', for application to interiors. Type 'A' mixture contains: White zinc oxide 15%; Industrial talc 15%; Pigments 0-70%; Chalk 70-0%. The formula for type 'B' pigment mixtures is: Pigments 0-30%; Chalk 100-70%.

AD-629 863 Fld. 11/3
DEPARTMENT OF THE NAVY WASHINGTON D C
USE OF ANTI-CORROSION AND ANTI-FOULING PAINTS BASED ON COAL TAR AND ITS MIXTURES WITH PHENOL OR EPOXY RESINS,
by E. D. Izralyants, and A. K. Muromtsev. 1966, 6p. Rept. no. Translation-2057,

Unclassified report

Primenenie Antikorrozionnykh i Neobrastaiushchikh Krasok na Osnov Kamennougolnogo Peka ili Smesi ego s Fenolnymi i Epoksidnymi Smolami, trans. of Lakokrasochne Materialy i Ikh Primenenie (USSR) n5 p44-6 1964.

Descriptors: (*Antifouling coatings, Tar), (*Corrosion inhibition, Tar), (*Tar, Antifouling coatings), Coal, Mixtures, Phenols, Epoxy plastics, Effectiveness, USSR

AD-629 861 **See Fld. 13/8**

AD-629 980 **See Fld. 20/13**

AD-630 036 **See Fld. 22/2**

AD-630 262 **See Fld. 11/9**

AD-630 283 **See Fld. 13/9**

AD-630 394 **See Fld. 9/1**

11/4. COMPOSITE MATERIALS

AD-629 777 Fld. 11/4
CFSTI Prices: HC $4.00 MF $1.00
DOW CORNING CORP MIDLAND MICH
INVESTIGATION OF THE PHYSICAL-CHEMICAL NATURE OF THE MATRIX-REINFORCEMENT INTERFACE.
Technical documentary rept. for 1 Jun 64-1 Jun 65,
by O. Johannson, F. Stark, and R. Baney. Sep 65, 144p. Contract AF 33 (615)-1667, Proj. AF-7342, Task 734202,
AFML TR-65-303-Pt-1

Unclassified report

Descriptors: (*Composite materials, Analysis), (*Glass textiles, Composite materials), (*Binders, Composite materials), Silanes, Plastics, Reinforcing materials, Volumetric analysis, Heavy water, Adsorption, Infrared spectroscopy, Electron microscopy, Chemical reactions, Thermochemistry, Radiochemistry

It was the intent of the investigation to initiate a study of those chemical phenomena which occur at the interfaces between glass and silane coupling agent and between coupling agent and resin matrix. From the data obtained on the adsorption of mono-functional silanes, it was possible to infer which reactions had occurred at the interface between coupling agent and glass. Heats of immersion of the glass in water have also been measured to determine the forces of interaction between the glass and water. The techniques which so far have yielded the most information capable of interpretation have been adsorption-desorption measurements, electron microscopic examination of treated surfaces, and isothermal heats of wetting. From the data obtained to date it is concluded that there is a very limited chemical reaction occurring between glass and coupling agent; most of the interaction at the glass interface is very weak. Conceivably the amount of reaction will be influenced by the method used to apply coupling agents to the glass surface. (Author)

AD-629 899 Fld. 11/4, 7/4
CFSTI Prices: HC $3.00 MF $0.50
ALPHA RESEARCH AND DEVELOPMENT INC BLUE ISLAND ILL
INTERFACIAL INTERACTION IN COMPOSITE STRUCTURES.
Final rept., 19 Feb 65-18 Feb 66,
by Robert L. Patrick, and William S. Layne. 18 Feb 66, 54p. Contract NOw-65-0315-f,

Unclassified report

Descriptors: (*Composite materials, Surface properties), (*Glass, Tensile properties), Rods, Dehydration, Tritium, Diffusion, Hydrates, Epoxy plastics

Glass rod is believed to lose much of its strength as a result of interaction with minute amounts of water. To test this theory, an anhydrous cell was fabricated in which a water vapor content of less than 5 ppm. Rods treated with water lost much of their strength. Experiments were continued to determine the efficacy of removal of tritiated water from glass surfaces with distilling solvents. Water was continuously removed from the solvent with calcium hydride. Results to date indicate that water is removed very slowly and incompletely by this method. In order to examine the path of diffusion through solid epoxy or the glass-epoxy interface, cells were fabricated from DER 332/DMP 30, and were filled with water. Losses of water were measured gravimetrically. Results indicate that if diffusion is the sole source of weight loss, that losses are not greater than 0.0000003 gram/day/sq. mm. If the diffusion is along the glass epoxy interface, it is not greater than 0.6 mm/sec. Studies of E-glass rods which had been dehydrated by roasting at 500C followed by treatment with tritiated water was found to bind tritium tightly to the surface. After initial drying, the residual tritium was reduced to about half after four hours additional drying. (Author)

AD-630 251 Fld. 11/4, 20/11
CFSTI Prices: HC $1.00 MF $0.50
AIR FORCE MATERIALS LAB WRIGHT-PATTERSON AFB OHIO
ELASTIC MODULI OF COMPOSITE MATERIALS REINFORCED WITH ORTHOTROPIC FILAMENTS.
Summary rept. for Aug-Nov 65,
by James M. Whitney. Jan 66, 22p. Rept. no. AFML-TR-65-411,
Proj. AF-7340, Task 734003,

Unclassified report

Descriptors: (*Composite materials, Modulus of elasticity), Filaments, Reinforcing materials, Mathematical analysis, Equations, Shear stresses

Approximate equations for determining the elastic constants of a unidirectional composite material reinforced with an orthotropic filament are derived. In particular, equations are developed for longitudinal modulus, transverse modulus, Poisson's ratio, and shear modulus. Filament and matrix elastic constants and fiber volume percent are the necessary parameters for determining these constants. Classical theory of elasticity is applied to a composite unit cell resulting in closed form solutions. Airy stress functions are applied to the fiber and matrix with boundary conditions requiring continuity of displacements across the fiber-matrix interface (perfect bonding is assumed) and continuity of appropriate stresses. Graphical results are shown for transverse modulus and shear modulus. (Author)

AD-630 256 Fld. 11/4
CFSTI Prices: HC $3.00 MF $0.50
MATERIALS ADVISORY BOARD NAS-NRC WASHINGTON D C
REPORT OF THE AD HOC COMMITTEE ON INTERFACE PROBLEMS IN FIBROUS COMPOSITES.
Final rept.
Nov 65, 54p. Rept. no. MAB-214-M,
Contract SD-118,

Unclassified report

Descriptors: (*Composite materials, Surface properties), (*Fibers (Synthetic), Composite materials), Loading (Mechanics), Manufacturing methods, Coatings, Degradation, Bonding, Failure (Mechanics), Diffusion

Although glass-reinforced plastics are widely used in missile and other military applications, it is well known that the potential strength of the reinforcing fibers is not achieved in the final composite. There is basis for believing that phenomena associated with the interface are frequently responsible to a significant extent for this limitation. In fibrous composites other than glass-reinforced plastics, problems of fabrication often are dominated by the need for wetting and for securing adequate bonds between fibers and matrix. Here it is evident that the lack of knowledge of the interface and the consequent inability to achieve control of the interface, limit progress in the development of these materials. The report discusses many factors that control the nature of the interface and its influence on the in-service strength of composites.

AD-630 318 Fld. 11/4, 13/10
CFSTI Prices: HC $2.00 MF $0.50
DAVID TAYLOR MODEL BASIN WASHINGTON D C STRUCTURAL MECHANICS LAB
ELASTIC MATERIAL CONSTANTS OF FILAMENT -WOUND CYLINDERS FABRICATED FROM E-HTS/E787 AND S-HTS/E787 PREIMPREGNATED ROVINGS.
Final rept.,
by Kenneth Hom, William P. Couch, and Abner R.Willner. Feb 66, 28p. Proj. S-F013-05-03, Task 1025,
DTMB 1823

Unclassified report

Descriptors: (*Filament wound construction, Composite materials), (*Composite materials, Filament wound construction), (*Submarine hulls, Composite materials), Plastics, Glass textiles, Deep submergence, Elasticity, Strain (Mechanics), Reinforcing materials, Stiffened cylinders

The elastic material constants of filament-wound, glass-reinforced-plastic cylinders fabricated from E-HTS/E787 and S-HTS/E787 preimpregnated rovings were experimentally determined for the case of plane stress. Cylinders with a 3.2-in. diameter were stressed under unidirectional loadings and the strains were measured to determine the elastic moduli and Poisson's ratios. The engineering elastic constants were then used to predict the measured strains of the 3.2-in.-diameter cylinders and also 6-in.-diameter cylinders subjected to biaxial (hydrostatic pressure) loading. The measured strains compared favorably with prediction. (Author)

AD-630 359 Fld. 11/4, 13/8
CFSTI Prices: HC $3.00 MF $0.75
GENERAL ELECTRIC CO PHILADELPHIA PA MISSILE AND SPACE DIV

INVESTIGATION OF BONDING IN OXIDE-FIBER (WHISKER) REINFORCED METALS.
Final rept. 1 Jul 64-31 Jul 65,
by Willard H. Sutton. 31 Jul 65, 67p. Contract DA-19-066-AMC-184 (X), Proj. DA-1A024401A110,
AMRA CR-65-01/4

Unclassified report

See also AD-468 203.

Descriptors: (*Composite materials, Bonding), (*Ceramic fibers, Bonding), (*Bonding, Composite materials), Whiskers (Crystals), Sapphires, Nickel, Single crystals, Doping, Surface-active substances, Chromium, Titanium, Zirconium, Shear stresses, Aluminum compounds, Oxides, Reinforcing materials

The effect of specific active elements on the wetting and bonding of nickel to single crystal sapphire (alpha-Al2O3) was investigated. Sessile drop experiments were conducted using specimens of pure nickel and nickel doped with small amounts of Cr, Ti, and Zr. Both the degree of wetting (contact angle) and the apparent shear strength between solidified metal drops and the sapphire were affected by the crystallographic orientation of the sapphire surface. It was demonstrated that a maximum shear strength of about 20,000 psi could be achieved for each of the doped specimens as a result of controlling the extent of the interfacial reactions. A theory was also advanced to describe the adherence between nickel and sapphire. (Author)

AD-630 434 Fld. 11/4, 11/9
CFSTI Prices: HC $2.00 MF $0.50
NAVAL ORDNANCE LAB WHITE OAK MD NON-METALLIC MATERIALS DIV
A MULTIAXIAL FATIGUE TEST FOR EVALUATION OF PLASTICS COMPOSITE MATERIALS.
Interim technical rept.,
by Marlin A. Kinna, and Stanley P. Prosen. 10 Feb 66, 31p. Proj. RREN-ST-204/212-5/0000, NOL TR-65-191

Unclassified report

Descriptors: (*Plastics, Composite materials), (*Composite materials, Test methods), (*Test methods, Fatigue (Mechanics)), Filament wound construction, Fibers, Reinforcing materials, Tests

An NOL Multiaxial Fatigue Test Method has been developed to obtain information on the dynamic properties of plastics composite materials. The test method uses an NOL ring segment as the test specimen, and strain gages mounted on a specially prepared post are used to monitor the resistance of the specimen to the applied multiaxial load. Results obtained in a statistical experiment set-up to evaluate the test method show that it is capable of differentiating between materials and/or fabrication parameters. In addition, reproducibility of the results is within the limits of accuracy relating to the winding, curing, and handling conditions imposed on the ring segments prior to testing. (Author)

AD-629 898 See Fld. 20/11

11/6. METALLURGY AND METALLOGRAPHY

AD-629 753 Fld. 11/6
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED CHEMISTRY
REDUCTION OF AN IRON CORE CONCENTRATE WITH HYDROGEN IN A SCREEN-PACKED FLUIDIZED BED,
by G. L. Osberg, and T. A. Tweddle. 9 Jun 65, 5p.
NRC 8794

Unclassified report

Availability: Published in I/EC Process Design and Development v5 p87-90 Jan 1966. Copies to DDC users only.

Descriptors: (*Ores (Metal sources), Reduction), (*Iron, Ores (Metal sources)), (*Fluidized bed processes, Iron), Hydrogen, Temperatures, Canada

Experimental results are described for the hydrogen reduction of iron ore in a bed fluidized in a 1 1/2-inch i.d. quartz column filled with a cylindrical screen packing. Fluidization was satisfactory at temperatures below 650C., but the addition of an antiagglomerating powder such as limestone was required for operation from 650 to 800C. Conversion data obtained from runs with and without packing show that hydrogen utilization per pass was higher with packing present. Higher operating flow rates and lower bed carryover were additional benefits obtained with packing. (Author)

AD-629 786 Fld. 11/6, 21/5
CFSTI Prices: HC $4.00 MF $1.00
GENERAL ELECTRIC CO SCHENECTADY N Y MATERIALS AND PROCESSES LAB
DEVELOPMENT OF HOT-CORROSION-RESISTANT ALLOYS FOR MARINE GAS TURBINE SERVICE.
Final summary rept.,
by Paul A. Bergman, Chester T. Sims, and Adrian M.Beltran. 21 Jan 66, 146p. Contract N600 (61533)63218,
MEL 131-66

Unclassified report

Descriptors: (*Corrosion-resistant alloys, Gas turbines), (*Gas turbines, Corrosion-resistant alloys), Marine surface propulsion, Naval equipment, Nickel alloys, Cobalt alloys, Tests, Test methods, Test equipment, Mechanical properties, Microstructure, Metallography, Gas turbine blades, Accelerated testing

A program was initiated to develop improved hot-corrosion-resistant alloys for Naval gas turbines. Two series of nickel-base alloys and one series of cobalt-base alloys plus appropriate commercial alloys were studied for possible service as blades and vanes, respectively. Hot-corrosion testing was conducted in two simulated gas turbine burner rigs, one designed particularly for this program. Test variables of temperature, air/fuel ratio, specimen configuration, and atomization effects have been studied using combusted diesel fuel and fixed amounts of sulfur and with salt injected. Proper conditions to achieve reproducible and discriminating hot-corrosion attack have been established. Relative behavior of both experimental and commercial alloys have been determined. The effects of individual element additions appear to have been identified in certain instances; in other cases, compositions were too complex for such separation. Thus, the effects of several elements in nickel-base alloys appear clear, but longer-time testing is recommended for cobalt-alloys. Mechanical properties and microstructures of alloys designed for this program are studied and reported. (Author)

AD-629 787 Fld. 11/6
CFSTI Prices: HC $1.00 MF $0.50
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH WRIGHT-PATTERSON AFB OHIO
ON THE FATIGUE LIMIT BEHAVIOR OF IRON AND MILD STEEL.
Final rept. Jun 62-Mar 65,
by Attwell M. Adair, and Harry A. Lipsitt. Dec 65, 23p. Rept. no. ARL-65-255,
Proj. AF-7021, Task 702105,

Unclassified report

Descriptors: (*Steel, Fatigue (Mechanics)), (*Iron, Fatigue (Mechanics)), State-of-the-art reviews, Crystal lattice defects, Metallography

A critical review of research in recent years on the fatigue limit behavior of iron and mild steel is combined with experiments on zone-refined iron to demonstrate the importance of interstitial-dislocation reactions to the nature of the fatigue limit. The controversy over whether the fatigue limit in ferritic materials results from a characteristic peculiar to the iron (bcc) lattice or results from strong initial dislocation locking and dynamic strain aging is somewhat clarified. It is shown that each of the extant ideas have some merit, and that each of the mechanisms thus far proposed are necessary, but individually insufficient, to provide the desired level of understanding of the fatigue limit behavior of metals. (Author)

AD-629 823 Fld. 11/6, 20/12
CALIFORNIA UNIV LA JOLLA
THE RESISTANCE MINIMUM IN DILUTE TI-MN ALLOYS,
by W. E. Gardner, and Ch. J. Raub. 10 Feb 65, 7p. Contract AF-AFOSR-631-64,
AFOSR 66-0054

Unclassified report

Research supported in part by NSF.

Availability: Published in Proceedings of the Physical Society v86 p647-51 1965. Copies to DDC users only.

Descriptors: (*Resistance (Electrical), Titanium alloys), (*Titanium alloys, Manganese alloys), Cryogenics, Temperature, Phase studies

From resistance measurements on dilute alloys of manganese in titanium it has been concluded that the resistance minimum observed in these alloys is associated both with localized moments on manganese atoms in the alpha phase and also with a proposed transformation of any beta filaments which are present.

AD-629 830 Fld. 11/6, 20/12
CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF PHYSICS
SUPRALEITUNG UND PHASENUMWANDLUNG BEI TITANLEGIERUNGEN. I. ZUSATZE VON VANADIUM + ALUMINIUM, NIOB UND MOLYBDAN (SUPERCONDUCTIVITY AND PHASE TRANSFORMATION IN TITANIUM ALLOYS. I. ADDITION OF VANADIUM PLUS ALUMINUM, NIOBIUM AND MOLYBDENUM),
by Von Christoph Julius Raub, and Ulrich Zwicker. 13 May 64, 5p. Contract AF-AFOSR-631-64,
AFOSR 65-2546

Unclassified report

Availability: Published in Supraleitung und Phasenum -wandlung bei Ti-Legierungen v55 n11 p711-5 1964. Copies to DDC users only.

Descriptors: (*Titanium alloys, Superconductivity), (*Superconductivity, Titanium alloys), (*Phase studies, Titanium alloys), Transition temperature, Vanadium alloys, Aluminum alloys, Niobium alloys, Molybdenum alloys

The change of transition temperature during the beta/alpha-transformation of the alloys TiV16Al3, TiMo16 and TiNb33 was investigated. The transition temperature is influenced by the concentration of the alloying elements in the beta-matrix and hence by the valence electron concentration. The influence of the ordered intermediate phases is small. The transition temperature of the alpha-solid solution can be increased by Va-group elements, but in the alloys investigated the transition temperature of beta-phase is higher than that of the alpha-phase and therefore the value for T sub corresponds to that of the beta-phase. The concentration of alloying elements in the beta-phase and thus the transition temperature can be shifted to higher or lower values by normal or up-hill diffusion during the transformation processes. (Author)

AD-629 839 Fld. 11/6
CORNELL UNIV ITHACA N Y DEPT OF ENGINEERING PHYSICS
OBSERVATIONS ON THE MORPHOLOGICAL CHANGES IN THIN COPPER DEPOSITS DURING ANNEALING AND OXIDATION,
by Luis Bachmann, David L. Sawyer, and Benjamin M. Siegel. 8 Jun 64, 7p. Contract AF-AFOSR-770-65, Proj. AF-9761 Task 976103, AFOSR 66-0052

Unclassified report

Availability: Published in Journal of Applied Physics v36 n1 p304-8 Jan 1965. Copies to DDC users only.

Descriptors: (*Copper, Annealing), Films, Oxides, Carbon, Silicon compounds, Monoxides, Copper compounds, Oxidation, Electron microscopy, Electron diffraction analysis

Thin copper films were deposited in an ultrahigh vacuum on carbon and silicon monoxide substrates at room temperature. Their morphological changes after annealing and oxidation were investigated by electron microscopy and electron diffraction. The changes during annealing of very thin deposits (<50 A mean thickness) are strongly influenced by the substrate. The copper on carbon substrates grows into large crystallites during heat treatment at 500 C whereas on silicon monoxide substrates very little recrystallization occurs. During the annealing of thicker deposits of copper, self-diffusion of the metal can take place and the change in structure of the heat-treated film is independent of the substrate. The structures of the cuprous oxide particles formed during exposure to different pressures of oxygen at 150 to 200 C indicate that different transport mechanisms are involved in the oxidation process at very low oxygen pressures from those at pressures above 0.01 Torr. (Author)

AD-629 841 Fld. 11/6
MCMASTER UNIV HAMILTON (ONTARIO) DEPT OF METALLURGY AND METALLURGICAL ENGINEERING
OXIDATION OF METALS AND ALLOYS.
Final rept., 31 Oct 63-31 Oct 65,
by W. W. Smeltzer. 31 Oct 65, 131p. Contract AF-AFOSR-515-64, Proj. AF-9763 Task 976301,
AFOSR 65-2236

Unclassified report

Availability: Published in various journals. Copies to DDC users only.

Descriptors: (*Alloys, Oxidation), (*Metals, Oxidation), Zirconium alloys, Iron alloys, Nickel alloys, Diffusion, Thermodynamics, Reaction kinetics, Electrolytic cells, Oxides, Mass spectroscopy, Electrical conductance, Canada

Research studies were conducted to obtain a more detailed understanding of the oxidation mechanism of zirconium and iron-nickel alloys, and the diffusion and thermodynamic properties of oxygen for the above systems. Emphasis was placed on precise measurements of reaction kinetics, and measurements of thermodynamic properties of oxides by the electromotive solid galvanic cell technique. Studies were initiated on the properties of ionic diffusion in metal oxides utilizing measurements of oxygen exchange by mass spectrometry and electrical conductivity. A brief summary of the completed investigations are presented; the full reports are appended. (Author)

AD-629 843 Fld. 11/6, 14/5, 20/12, 20/6
PENNSYLVANIA STATE UNIV UNIVERSITY PARK MATERIALS SCIENCE LAB
THE APPLICATION OF COLOR PHOTOGRAHY TO TRANSMISSION ELECTRON MICROSCOPE STUDIES OF THIN METAL FOILS,
by I. E. Murr, and M. C. Inman. 28 Apr 65, 10p. Contract AF-AFOSR-669-64,
AFOSR 65-2126

Unclassified report

Supported in part by NSF.

Availability: Published in Phys. Stat. Sol. v10 p441-5 1965. Copies to DDC users only.

Descriptors: (*Foils, Color photography), (*Color photography, Electron microscopy), (*Crystal lattice defects, Color photography), Metals, Grain structures (Metallurgy), Microstructure, Nickel, Silver

A study was made of the application of color photography to observations of dislocation motion and other time dependent phenomena in thin metal foils by transmission electron microscopy. In the present application, pairs of sequential electron transmission micrographs are first superposed optically to obtain color addition. The superposed image is then photographed using standard color emulsions. It was found that photographic density changes in black and white which result from the movement of dislocations, bend contours, dispersed particles and like phenomena, are sensitively reproduced as a corresponding color change which is immediately apparent to the eye. (Author)

AD-629 850 Fld. 11/6, 20/2, 20/11
CLEMSON UNIV S C
ELASTIC STRENGTH OF TIN WHISKERS IN TENSILE TESTS,
by B. E. Powell, and M. J. Skove. 6 Nov 64, 3p. Contract AF-AFOSR-180-65,
AFOSR 65-2577

Unclassified report

Availability: Published in Journal of Applied Physics v36 n4 p1495-6 Apr 1965. Copies to DDC users only.

Descriptors: (*Tin, Whiskers (Crystals)), (*Whiskers (Crystals), Tin), Elasticity, Strength, Yield point, Test methods, Strain (Mechanics), Stresses, Tensile properties

AD-629 903 Fld. 11/6, 7/3
CFSTI Prices: HC $14.90 MF $1.00
VIRGINIA UNIV CHARLOTTESVILLE RESEARCH LABS FOR THE ENGINEERING SCIENCES
THE LOW PRESSURE OXIDATION OF COPPER SINGLE CRYSTALS.
Technical rept. (Master's thesis),
by Don Frederick Mitchell. Oct 65, 153p. Rept. no. MS-3531-102-66U,
Contract Nonr-474 (11),

Unclassified report

Descriptors: (*Copper, Oxidation), (*Oxidation, Copper), (*Corrosion, Metals), Single crystals, Oxygen, Chemisorption, Reaction kinetics, Surface properties, Crystal structure, Electron microscopy, X-ray diffraction analysis

The objective of this research was to determine the mechanism of the low pressure thermal oxidation of copper, from an investigation of (1) the oxide and metal topography, (2) the structural relationships of oxide and metal, (3) the kinetics of the nucleation and growth of the islands of reaction product (nuclei). The system, copper plus oxygen, was chosen for study for two main reasons. One was that it had recently been shown that nucleation of oxide occurred on copper over a wide range of easily obtainable conditions. The second reason was that copper had previously been used for oxidation studies in this laboratory and techniques had been developed for the preparation and handling of large single crystal samples. (Author)

AD-630 060 Fld. 11/6
RIAS INC BALTIMORE MD
ON THE ROLE OF COMPLEX IONS IN THE SEASONCRACKING OF ALPHA-BRASS,
by E. N. Pugh, W. G. Montague, and A. R. C. Westwood. 30 Aug 65, 7p. Contract DA-31-124-ARO (D)-258,
AROD 5023:3

Unclassified report

Availability: Published in Transactions Quarterly v58 n4 p665-71 Dec 1965. Copies to DDC users only.

Descriptors: (*Brass, Stress corrosion), (*Fracture (Mechanics), Brass), Copper compounds, Complex compounds, Ions, Ammonia, Ammonium compounds, Concentration (Chemistry), Catalysis, Surface properties

The behavior of alpha-brass in aqueous ammonia has been shown to depend critically on the concentration of cupric complex ions, Cu (NH3)n (2+), present in the environment. In addition to markedly affecting stress -corrosion life, the concentration of these ions also determines the mode of stress-corrosion failure and the surface condition of the testpieces. The presence of cupric complex ions also results in increased rates of dissolution. The latter effect is attributed to an autocatalytic reaction between the complex ions and copper atoms at the brass surface. The relevance of these observations to certain practical aspects of stress-corrosion cracking in brass is discussed. (Author)

AD-630 070 Fld. 11/6, 11/2
CFSTI Prices: HC $9.60 MF $0.75
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
SHORT-TIME, HIGH-TEMPERATURE CREEP STRENGTH OF MOLYBDENUM-0.5% TITANIUM.
Technical memo.,
by James M. Akridge. Nov 65, 94p. Rept. no. tg-737,
Contract NOw-62-0604-c,

Unclassified report

Master's thesis submitted to Maryland Univ., College Park.

Descriptors: (*Refractory metal alloys, High-temperature research), (*Creep, Refractory metal alloys), (*Molybdenum alloys, Titanium alloys), Strength, Oxidation, Coatings, Silicides, Hypersonic flow, Test methods, Stresses, Loading (Mechanics), Tensile properties

Short-time, high-temperature creep tests were conducted on a molybdenum-0.5% titanium alloy. Test samples were one-half inch wide x 0.060 inch thick molybdenum strip in the stress relieved condition. Prior to testing the samples were coated with a silicide oxidation resistant coating (Pfaudler PFR-6). The tests were conducted at four stress levels ranging from a low of 8470 psi to a high of 20350 psi. Temperatures ranged from 2300F to 3000F. Time under load was in general less than 1000 seconds. The creep strength of this alloy was found to decrease very rapidly with increasing temperature at temperatures between 2300F and 2600F. At temperatures above 2600F strength decreased less rapidly with increasing temperature. This phenomenon is believed to be caused by recrystallization and grain growth at temperatures between 2300F and 2600F. At temperatures above 2600F recrystallization was essentially complete before the sample was loaded, approximately 15 seconds, resulting in less sensitivity to temperature in this range.

AD-630 071 Fld. 11/6
MASSACHUSETTS INST OF TECH CAMBRIDGE CORROSION LAB
STRESS CORROSION AND HYDROGEN CRACKING OF 17-7 STAINLESS STEEL,
by I. Matsushima, D. Deegan, and H. H. Uhlig. 12 Jul 65, 6p. Contract DA-31-124-ARO (D)-47,
AROD 2841:6

Unclassified report

Availability: Published in Corrosion v22 n1 p23-7 Jan 1966. Copies to DDC users only.

Descriptors: (*Stainless steel, Stress corrosion), (*Hydrogen embrittlement, Stainless

steel), (*Stress corrosion, Stainless steel), Sulfuric acid, Arsenic compounds, Oxides, Magnesium compounds, Chlorides, Austenite, Ferrites, Failure (Mechanics). Chromium alloys, Nickel alloys

Whether a stainless steel fails by stress corrosion cracking or by hydrogen cracking depends on its structure. A pure ferritic 18-8, body-centered cubic as quenched, fails by hydrogen cracking when cathodically polarized in dilute sulfuric acid containing arsenic trioxide. However, it is resistant to stress corrosion cracking in MgCl2 solution boiling at 154C (310F). A similar composition austenitic 18-8, face-centered cubic as quenched and tested similarly is resistant to hydrogen cracking but fails by stress corrosion cracking. Type 301 austenitic 17-7 stainless steel, which transforms in part to ferrite on cold rolling, is resistant, therefore, to hydrogen cracking as annealed-quenched or slightly cold reduced. It fails within 10-30 minutes when cold reduced more than 20 percent even though it transforms only partially to ferrite. In MgCl2 solution, both the annealed-quenched and the cold-reduced alloy fail, cracking times being prolonged by cathodic polarization, characterizing the failures as stress corrosion cracking. Contrary to reactions observed in pure phase alloys, stainless steels containing mixtures of austenite and ferrite may fail either by hydrogen cracking or by stress corrosion cracking, depending on the environment. (Author)

AD-630 113 Fld. 11/6, 13/8
CFSTI Prices: HC $5.60 MF $0.50
BATTELLE MEMORIAL INST COLUMBUS OHIO
TITANIUM BIBLIOGRAPHY 1900-1951. 1952 SUPPL.,
by Beverly J. Archer, and Robert W. Gibson. 1953, 55p. Contract DA-33-019-ORD-722, WAL 401/174-Suppl.

Unclassified report

See also AD-630 129.

Descriptors: (*Titanium, Bibliographies), Mechanical working, Titanium alloys, Metallurgy, Chemistry, Chemical analysis, Refining (Metallurgy), Material forming, Powder metallurgy, Heat treatment, Joining, Metallography, Physical properties, Mechanical properties, Surface properties, Titanium compounds

Contents: General, Raw materials and ore preparation, Chemistry of titanium, Chemical analysis for titanium, Extraction, reduction, and refining, Foundry, Mechanical working, Powder metallurgy, Heat treatment, Joining, Cleaning, coating, and finishing, Constitution and primary structure of titanium and its alloys, Transformations and resulting structures, Physical properties, Mechanical properties and tests, Surface properties, Alloys of Ti, Applications of titanium, Applications of titanium compounds.

AD-630 129 Fld. 11/6, 13/8
CFSTI Prices: HC $20.10 MF $1.25
BATTELLE MEMORIAL INST COLUMBUS OHIO
TITANIUM BIBLIOGRAPHY 1900-1951,
by Charles A. Brophy, Beverly J. Archer, and Robert W. Gibson. 1952, 205p. Contract DA-33-019-ORD-722, WAL 401/174

Unclassified report

Descriptors: (*Titanium, Bibliographies), Mechanical working, Titanium alloys, Metallurgy, Chemistry, Chemical analysis, Refining (Metallurgy), Processing, Material forming, Powder metallurgy, Heat treatment, Joining, Metallography, Physical properties, Mechanical properties, Surface properties, Titanium compounds, Extraction, Reduction (Chemistry), Cleaning, Finishes + finishing

Contents: General, Raw materials and ore preparation, Chemistry of titanium, Chemical analysis for titanium, Extraction, reduction, and refining, Foundry, Mechanical working, Powder metallurgy, Heat treatment, Joining, Cleaning, coating, and finishing, Constitution and primary structure of titanium and its alloys, Transformations and resulting structures, Physical properties, Mechanical properties and tests, Surface properties, Alloys of Ti, Applications of titanium, Applications of titanium compounds.

AD-630 276 Fld. 11/6, 7/2
CFSTI Prices: HC $2.00 MF $0.50
MATERIALS ADVISORY BOARD NAS-NRC WASHINGTON D C
COOPERATIVE ANALYSIS PROGRAM ON REFRACTORY METAL ALLOYS.
Feb 66, 50p. Rept. no. MAB-217-M, Contract SD-118,

Unclassified report

Rept. of the Subpanel on Analysis Methods Refractory Metals Sheet Rolling Panel.

Descriptors: (*Refractory metal alloys, Rolling (Metallurgy)), (*Chemical analysis, Refractor metal alloys), Niobium alloys, Tantalum alloys, Molybdenum alloys, Tungsten alloys, Oxygen, Carbon, Nitrogen, Hydrogen

As a part of the Refractory Metals Sheet Rolling Program, reference materials (unalloyed W, T-111 Ta, FS-85 Cb, and TZM Mo) were prepared and analyzed by 25 cooperating laboratories. No serious problems were encountered in determining alloying elements. Hydrogen and carbon determinations could be made satisfactorily at the levels encountered, but agreement on oxygen and nitrogen was not satisfactory below the 10 ppm level. Recommendations for research to solve remaining problems are offered. (Author)

AD-630 412 Fld. 11/6, 7/4
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
INVESTIGATION OF CONCENTRATION DEPENDENCE OF THE INTENSITY OF ALUMINUM AND ZINC LINES IN CONTACT-PULSE SAMPLING OF THE AL-ZN ALLOY SUBSTANCE,
by D. P. Milenia, N. K. Rudnevskii, and T. M.Safoneieva. 1 Feb 66, 8p. Rept. no. FTD-TT-65-1639, TT 66-60827

Unclassified report

Unedited rough draft trans. of Trudy po Khimii Khimicheskoi Tekhnologii (USSR) n1 p8-11 1963.

Descriptors: (*Aluminum alloys, Zinc alloys), (*Line spectrum, Aluminum alloys), Intensity, Concentration (Chemistry), Electric arcs, Sparks, Combustion, USSR

Contact-pulse sampling of the substance of an Al-Zn alloy of various composition with subsequent combustion of the sample in an ac arc and recording of line intensity by means of a FES-1 was investigated. This method makes it possible to obtain in logarithmic coordinates a linear dependence of the absolute and relative intensities of the zinc and aluminum lines on the concentration of these elements for a very wide interval. The role of polarity in contact-pulse sampling of test alloys was investigated and it was demonstrated that the angular coefficient of the dependence lgI = f (lgC) for the aluminum line is greater with a positive polarity and for the zinc line with a negative polarity. The angular coefficient for relative line intensity is greater in the case of positive polarity. (Author)

AD-630 420 Fld. 11/6
CFSTI Prices: HC $2.00 MF $0.50
FRANKFORD ARSENAL PHILADELPHIA PA QUALITY ASSURANCE DIRECTORATE
RELATIONSHIP BETWEEN EMBRITTLEMENT BEHAVIOR AND INTERFACIAL ENERGIES FOR COPPER WETTED WITH BINARY BISMUTH-THALLIUM LIQUID METAL ALLOYS AT 650 F,
by Bernard J. Rogus. Feb 66, 30p. FA R-1800

Unclassified report

Descriptors: (*Copper, Embrittlement), (*Liquid metals, Compatibility), (*Bismuth alloys, Thallium alloys), Surface properties, Surface-active substances, Temperature, Fracture (Mechanics)

Embrittlement behavior of copper was studied in terms of interfacial energies between the solid copper and binary bismuth-thallium liquid metal compositions. Wetted fracture strength determinations were made on copper tensile specimens which were in contact with the liquid metal alloys at 650 F. Tests were made as the relative proportions of bismuth and thallium in the liquid wetting metal were varied. It was found that the embrittling effect of bismuth on copper decreases as the thallium content of the wetting bismuth-thallium alloy is increased. This trend to higher strength values was correlated with the corresponding increase in interfacial energies for the copper-bismuth-thallium system. The embrittlement of solid copper may be related to reductions in surface energy requirements needed for crack propagation as a result of the presence of the liquid metal. However, deviations noted in the relationship between wetted fracture strength values and interfacial energies suggest that embrittlement behavior cannot be explained fully on the basis of interfacial energies alone. (Author)

AD-630 427 Fld. 11/6, 13/8
CFSTI Prices: HC $7.00 MF $1.50
BATTELLE MEMORIAL INST COLUMBUS OHIO
SURVEY OF CURRENT KNOWLEDGE OF THE DEFORMATION CHARACTERISTICS OF BERYLLIUM, THE REFRACTORY METALS, AND THE SUPERALLOYS.
Final technical rept. 10 Feb 65-10 Feb 66,
by F. W. Boulger, A. F. Gerds, W. A. Glaeser, H. J. Henning, and A. T. Hopper. 10 Feb 66, 322p. Contract NOw-65-0259 C,

Unclassified report

Descriptors: (*Beryllium, Deformation), (*Refractory metals, Deformation), (*Alloys, Deformation), (*Material forming, Metals), Plasticity, Explosive forming, Mechanical working, Drawing (Machine processing), Rods, Wire, Pipes, Extrusion, Copper, Reviews

The report covers the following subjects: theory of plasticity, high-velocity forming, work-hardening mechanisms in metals, shear forming and spinning of metals, friction and wear in metal-deformation processes, rod, wire, and tube drawing, and applications of static high pressure to the forming of metals - hydrostatic extrusion.

AD-629 824 See Fld. 20/12

AD-629 826 See Fld. 20/12

AD-629 828 See Fld. 20/12

AD-629 912 See Fld. 11/11

AD-629 921 See Fld. 20/11

AD-630 204 See Fld. 13/8

AD-630 360 See Fld. 18/9

AD-630 440 See Fld. 13/8

AD-630 451 See Fld. 20/12

AD-630 457 See Fld. 7/4

AD-630 458 See Fld. 7/4

AD-630 459 See Fld. 7/4

AD-630 464 See Fld. 13/8

AD-630 467 See Fld. 7/4

11/7. MISCELLANEOUS MATERIALS

AD-629 960 Fld. 11/7, 20/13
CFSTI Prices: HC $2.00 MF $0.50
MIDWEST RESEARCH INST KANSAS CITY MO
MATERIALS RESEARCH FOR HEAT TRANSFER FLUIDS.
Technical documentary rept., Jan 64-Jun 65,
by Karl R. Mecklenburg. Feb 66, 37p. Contract AF 33 (657)-10295 Proj. AF-7343 ,AF-7340 Task 734302,734008
AFML TDR-64-16-Pt-4
Unclassified report

See also AD-627 170.

Descriptors: (*Liquid metal coolants, Sodium), (*Sodium, Heat transfer coefficients), Condensation, Boilers, Heat transfer, Corrosion resistance

Liquid metals have certain properties that make them candidates for heat transfer use in aerospace systems. The objective of the investigation was to determine the magnitude of the heat transfer coefficient of condensation for sodium. Design factors and program organization are discussed, and a description of the equipment is presented. The heat transfer experiments were conducted in a closed boiler system, in which the sodium was boiled in the lower region and condensed upon an instrumented surface in the upper region. Operational techniques and history are discussed, including the massive, premature failure of the condensing section. The 1700F sodium leaked into the 500F cooling air passage and generated a considerable amount of dense smoke before complete shutdown of the equipment. Only three data points were obtained. The heat transfer coefficients for condensing sodium ranged from 79.8 to 473.6 Btu/hr-sq. ft - deg F for heat fluxes of 7,683 to 24,083 Btu/hr-sq. ft. A sample calculation is presented. The boiler material showed satisfactory corrosion resistance to sodium but not to the sodium and air reaction. Differential thermal expansion apparently loosened the special surface thermocouples, allowing the sodium to leak into the coolant passage. (Author)

11/8. OILS, LUBRICANTS, AND HYDRAULIC FLUIDS

AD-629 918 Fld. 11/8, 13/8
CFSTI Prices: HC $1.00 MF $0.50
ARMY WEAPONS COMMAND ROCK ISLAND ILL RESEARCH AND ENGINEERING DIV
EVALUATION OF CUTTING FLUID APPLICATION METHODS.
Technical rept.,
by Lanny D. Wells. Feb 66, 16p. Rept. no. RIA-66-734,
Proj. PEMA-66261,
Unclassified report

Descriptors: (*Cutting fluids, Performance (Engineering)), Machining, Sprays, Effectiveness, Colloids

An investigation of the effects of different cutting fluid application methods has been conducted. Conventional flood application was compared with mist application from three different mist units. Under most conditions flood application resulted in slightly better performance. However, different water soluble cutting fluids and different fluid concentrations had a greater effect on performance than the application method. (Author)

AD-629 938 Fld. 11/8, 13/9
CFSTI Prices: HC $2.60 MF $0.50
SOUTHWEST RESEARCH INST SAN ANTONIO TEX DEPT OF AEROSPACE PROPULSION RESEARCH
RESEARCH ON MITIGATION OF SPLINE WEAR BY MEANS OF LUBRICATION.
Quarterly progress rept. no. 3, 15 Nov 65-15 Feb 66,
by W. D. Weatherford Jr., M. L. Valtierra, and P. M. Ku. 15 Feb 66, 27p. Rept. no. RS-485, Contract NOw-65-0224-f,
Unclassified report

Descriptors: (*Gears, Wear resistance), (*Lubrication, Gears), Lubricants, Lubricant additives, Antioxidants, Mineral oils, Hydrocarbons, Oxidation

Experiments were made to investigate the effect of hydrocarbon antioxidants on the spline wear observed when operating submerged in mineral oil. The results indicate that certain hydrocarbon antioxidants provide periods of negligible wear which otherwise do not occur in air-saturated mineral oil. The observed antioxidant effect and previously reported influences of environment composition are tentatively interpreted in terms of postulated wear mechanisms. (Author)

AD-630 262 See Fld. 11/9

11/9. PLASTICS

AD-630 019 Fld. 11/9, 7/4
CFSTI Prices: HC $2.00 MF $0.50
POLYTECHNIC INST OF BROOKLYN N Y
THE EFFECTS OF INTERMOLECULAR FORCES ON POLYMER RHEOLOGY. II. HYDROGEN BONDING ABOVE TG.
Research rept.,
by Edward P. Otocka, and F. R. Eirich. Mar 66, 50p. Rept. no. pibal-911,
Contract Nonr-839 (32) (FBM) Proj. NR-064 457,
Unclassified report

See also AD-437 336.

Descriptors: (*Polymers, Molecular association), (*Rheology, Polymers), (*Molecular association, Rheology), Butadienes, Acrylic resins, Vinyl plastics, Modulus of elasticity, Stresses, Chemical bonds, Hydrogen, Transition temperature, Glass, Films, Absorption spectrum

A series of three butadiene/methacrylic acid copolymers and three butadiene/2-methyl-5-vinyl pyridine copolymers were evaluated for Young's modulus and stress relaxation modulus between -75C and +75C. Corresponding members of the acidic and basic copolymer series were stoichiometrically combined to provide an intermolecularly hydrogen bonded material which was tested in the same manner. Comparison between the observed modulustemperature curves for the mixed material and the average of the parent materials' modulus-temperature curve reveals a regular, temperature dependent increase in Young's modulus above Tg. Below Tg the rate of increase decreases. The stress relaxation curves of the acidic, basic and mixed copolymers were normalized with respect to Tg. The curves were then differentiated to provide relaxation spectrum curves. The comparison of the average relaxation spectrum curves for the parent materials with that obtained for the mixed material shows depression of short time relaxation mechanisms. Infrared investigations of the hydrogen bond absorptions in stretched films are also discussed. (Author)

AD-630 262 Fld. 11/9, 11/3, 11/8, 11/10
CFSTI Prices: HC $2.00 MF $0.50
PENNSALT CHEMICALS CORP PHILADELPHIA PA
POTENTIAL APPLICATIONS OF POLY (METAL PHOSPHINATES): ANTISTATIC COATINGS, MULTI -PURPOSE THICKENERS AND EXPLORATORY STUDIES ON THERMALLY STABLE ELASTOMERS.
Semiannual rept. no. 1, 18 Jun-17 Dec 65,
by Anthony J. Saraceno, Peter F. Radice, Andrew J. Hamilton Jr., and B. Peter Block. Jan 66, 42p. Contract N156-46781, Proj. Pennsalt-120989, Task RRMA-03-013/200-1/F020-03-01,
Unclassified report

Descriptors: (*Polyester plastics, Organic phosphorus compounds), (*Organic phosphorus compounds, Polymers), (*Plastic coatings, Organic phosphorus compounds), (*Lubricant additives, Organic phosphorus compounds), (*Elastomers, Organic phosphorus compounds), Films, Polyethylene plastics, Static electricity, Inhibition, Adhesion, Toughness, Plasticizers, Chromium compounds, Greases, Viscosity, Heat-resistant materials, Siloxanes, Halocarbon plastics, Zinc compounds

Plasticized compositions of (Cr (H2O) (OH) (OPPh2O)2)x with TCP were found to dissipate electrostatic charge both as a film per se and as a transparent coating on conventional organic film such as PE. Studies with a gold-leaf electroscope indicate better antistatic behavior with increasing thickness from 0.05 to 0.50 mils and increasing plasticizer content from 30 to 70% by weight. Some evidence of heat sealability was indicated for the 75-80% TCP plasticized compositions. In some of the coatings several resins were evaluated as matrices to improve the toughness and adhesion of the coating. An end-capped Cr hydroxyaquo methylphenyl- dioctylphosphinate copolymer was prepared and tested for thickening ability in methyl phenyl siloxane DC 550, Hercolube A-P.E. ester and di (2-ethylhexyl) sebacate fluids. The thickener successfully gels all three fluids to stable greases.

AD-629 761 See Fld. 7/2

AD-629 930 See Fld. 9/1

AD-629 972 See Fld. 11/10

AD-630 000 See Fld. 7/4

AD-630 191 See Fld. 5/1

AD-630 434 See Fld. 11/4

11/10. RUBBERS

AD-629 891 Fld. 11/10
CFSTI Prices: HC $2.60 MF $0.50
REACTION MOTORS DIV THIOKOL CHEMICAL CORP DENVILLE N J
CARBORANE-SILOXANE ELASTOMERS.
Quarterly progress rept. for 19 Nov 65-18 Feb 66,
by Joseph Green. 18 Feb 66, 22p. Rept. no. RDM-5065-Q4,
Contract DA-11-070-AMC-852 (W), Proj. DA-5065,
Unclassified report

See also AD-624 735.

Descriptors: (*Elastomers, Synthesis (Chemistry)), (*Organoboranes, Elastomers), (*Siloxanes, Elastomers), Synthesis (Chemistry), Polymerization, Polymers, Alkylation, Alkanes, Heat-resistant plastics, Metalorganic compounds

The preparation of dicarboranyl alkanes by carboranylation of diacetylenic compounds and by alkylation of metallo carborane compounds was investigated. o-Carborane derivatives of such compounds were prepared by carboranylation of acetylenic compounds. Alkylation reactions yielded o-carborane exocycles and m-carborane low polymers. A monomer, bis (1-chlorodimethylsilyl-o-carboran-2-yl) propane was prepared and its

thermal isomerization to the m-carborane derivative was attempted. (Author)

AD-629 972 Fld. 11/10, 11/9
CFSTI Prices: HC $1.00 MF $0.50
ARMY WEAPONS COMMAND ROCK ISLAND ILL RESEARCH AND ENGINEERING DIV
COAGENTS FOR IMPROVING ELASTIC RECOVERY IN POLYESTER URETHANE ELASTOMERS.
Technical rept.,
by John A. Williams. Jan 66, 16p. Rept. no. RIA-66-382,
Proj. DA-1C024401A329,

Unclassified report

Descriptors: (*Elastomers, Isocyanate plastics), (*Aging (Materials), Elastomers), Additives, Vulcanization, Vulcanizates, Peroxides, Tensile properties, Hardness, Modulus of elasticity, Elongation

A number of chemicals were evaluated as coagents in the peroxide vulcanization of polyester urethanes to determine their ability to produce vulcanizates with good elastic recovery. Several coagents evaluated with high levels (6 pphr) of peroxide produced vulcanizates with improved elastic recovery compared with vulcanizates crosslinked with high peroxide alone. Tensile strength was unaffected while modulus and hardness increased and elongation decreased. Certain coagents when evaluated with low levels (3 pphr) of peroxide produced vulcanizates with improved elastic recovery and only slightly decreased tensile strength compared with vulcanizates cured with high peroxide alone. (Author)

AD-630 262 **See Fld. 11/9**

11/11. SOLVENTS, CLEANERS AND ABRASIVES

AD-629 912 Fld. 11/11, 13/8, 11/6
CFSTI Prices: HC $2.00 MF $0.50
CHEMICAL CORP SPRINGFIELD MASS
INVESTIGATION OF ELECTROPOLISHING SOLUTION.
Technical rept.,
by William C. Jones. 31 Dec 65, 37p. Contract DA-19-020-AMC-0264(W),
SA TR-18-1099

Unclassified report

Descriptors: (*Steel, Electrolytic polishing), (*Electrolytic polishing, Fluoborates), (*Fluoborates, Inorganic acids), Additives, Oxalic acids, Boric acids, Carboxylic acids, Sodium compounds, Iron compounds, Cyanides, Chromic acids, Acetic acids, Glycines, Processing, Gun barrels, Rifles

The report covers an investigation of the electropolishing properties of commercial fluoboric acid alone and in combination with various additives including glycerine, citric acid, gluconic acid, oxalic acid, boric acid, sodium ferrocyanide, chromic acid, and acetic acid. Evaluation was made primarily by voltage current relationships and also by the use of a specialized ten-section cell. Results indicated rapid metal removal but the range of voltage through which electropolishing was achieved was narrow and the polishing results obtained were generally poor. On the basis of the results of the nvestigation, it does not appear that the solution described in the U. S. Patent no. 2,986,499 can be directly applied to the electropolishing of the internal surface of rifle barrels. (Author)

Field 12-MATHEMATICAL SCIENCES

12/1. MATHEMATICS AND STATISTICS

AD-629 790 Fld. 12/1, 20/10
MARYLAND UNIV COLLEGE PARK INST FOR FLUID DYNAMICS AND APPLIED MATHEMATICS
SINGULARITIES OF ANALYTIC FUNCTIONS HAVING INTEGRAL REPRESENTATIONS, WITH A REMARK ABOUT THE ELASTIC UNITARITY INTEGRAL,
by R. P. Gilbert, H. C. Howard, and S. Aks. 15 Oct 64, 8p. Contract AF-AFOSR-400-64,NSF-GP-3 Proj. AF-9749, Task 974901,
AFOSR 65-2329

Unclassified report

Availability: Published in Journal of Mathematical Physics v6 n7 Jul 1965. Copies to DDC users only.

Descriptors: (*Functions, Integrals), (*Integrals, Functions), (*Field theory, Integrals), Perturbation theory, Complex variables

In this paper a survey is given of some results obtained recently concerning the singularities of holomorphic functions having integral representations. These results are all essentially extensions or modifications of those developed by Hadamard (for the proof of his multiplication of singularities theorem) to the case of several complex variables. In concluding, the authors consider the connection between the original Hadamard idea and the elastic unitarity integral of the quantum theory of fields. (Author)

AD-629 791 Fld. 12/1
MARYLAND UNIV COLLEGE PARK INST FOR FLUID DYNAMICS AND APPLIED MATHEMATICS
ON SOLUTIONS OF THE GENERALIZED BIAXIALLY SYMMETRIC HELMHOLTZ EQUATION GENERATED BY INTEGRAL OPERATORS,
by R. P. Gilbert, and H. C. Howard. 2 May 64, 13p. Contract AF-AFOSR-400-64,NSF-GP-2067 Proj. AF-9749, Task 974901,
AFOSR 65-2111

Unclassified report

Availability: Published in Journal fue die reine nd angewandte Mathematik v218 p109-20 1965. Copies to DDC users only.

Descriptors: (*Partial differential equations, Operators (Mathematics)), Integrals, Potential theory, Functional analysis, Equations of motion

AD-629 792 Fld. 12/1
MARYLAND UNIV COLLEGE PARK INST FOR FLUID DYNAMICS AND APPLIED MATHEMATICS
ON SOLUTIONS OF THE GENERALIZED AXIALLY SYMMETRIC WAVE EQUATION REPRESENTED BY BERGMAN OPERATORS,
by R. P. Gilbert, and H. C. Howard. 4 May 64, 17p. Contract AF-AFOSR-400-64 ,NSF-GP-2067
AFOSR 65-2344

Unclassified report

Availability: Published in Proceedings of the London Mathematical Society Series 3 v15 n2 p346-60 Apr 1965. Copies to DDC users only.

Descriptors: (*Partial differential equations, Operators (Mathematics)), Integrals, Potential theory, Functional analysis, Equations of motion

AD-629 793 Fld. 12/1
MARYLAND UNIV COLLEGE PARK INST FOR FLUID DYNAMICS AND APPLIED MATHEMATICS
ON GENERALIZED AXIALLY SYMMETRIC POTENTIALS WHOSE ASSOCIATES ARE DISTRIBUTIONS,
by R. P. Gilbert. 4 Jun 65, 13p. Contract AF-AFOSR-400-64, Proj. AF-9749, Task 974901, AFOSR 65-2325

Unclassified report

Availability: Published in Scripta Mathematica v27 n3 p245-56 1964. Copies to DDC users only.

Descriptors: (*Potential theory, Distribution theory), (*Distribution theory, Potential theory), Functions, Operators (Mathematics), Integrals

AD-629 794 Fld. 12/1
MARYLAND UNIV COLLEGE PARK INST FOR FLUID DYNAMICS AND APPLIED MATHEMATICS
A FIXED POINT THEOREM FOR IN THE LARGE APPLICATION OF THE CONTRACTION PRINCIPLE,
by J. B. Diaz, and Sherwood C. Chu. 2 Dec 64, 13p. Contract AF-AFOSR-400-64, Proj. AF-9749, Task 974901,
AFOSR 65-2235

Unclassified report

Prepared in cooperation with Bellcomm, Inc., Washington, D. C.

Availability: Published in Atti della Accedemia delle Scienze di Torino v99 p351-63 1964-5. Copies to DDC users only.

Descriptors: (*Theorems, Integral equations), (*Integral equations, Theorems), Mapping (Transformations), Equations

AD-629 795 Fld. 12/1
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB
A NOTE ON THE EVALUATION OF THE TOTAL SQUARE INTEGRAL.
Revised ed.,
by E. I. Jury. 28 Aug 64, 3p. Contract AF-AFOSR-292-64, Proj. AF-9749, Task 974901,
AFOSR 65-2431

Unclassified report

Revision of manuscript submitted 26 Jun 64.

Availability: Published in IEEE Transactions on Automatic Control vAC-10 n1 p110-1 Jan 1965. Copies to DDC users only.

Descriptors: (*Integrals, Matrix algebra), Polynomials, Determinants

The purpose of this correspondence is (1) to show the general formulation of the total square integrals in discrete systems and (2) to show for such a formulation we need to expand only (n-1)-order determinant.

AD-629 805 Fld. 12/1, 20/4
BOSTON UNIV MASS DEPT OF PHYSICS
PARAMETER OF DISCONTINUITY AND DIFFERENTIAL-OPERATOR EXPANSION OF THE LINEAR BOLTZMANN OR MASTER OPERATOR,
by Armand Siegel, and Hachiro Akama. 12 Mar 65, 21p. Contract AF-AFOSR-557-64, Proj. AF-9767, Task 976701,
AFOSR 66-0385

Unclassified report

Availability: Published in The Physics of Fluids v8 n7 p1218-36 Jul 1965. Copies to DDC users only.

Descriptors: (*Operators (Mathematics), Series), Integrals, Relaxation time, Equations of motion, Probability, Model theory, Fluid mechanics

The ratio of the average microscopic agitation interval to the macroscopic relaxation time is proposed as the expansion parameter of linear Boltzmann or master operators. This parameter

is interpretable physically both as a measure of the discontinuity of the random process, and as an inverse measure of the size of the fluctuating system. In the limit when the expansion parameter is zero, the process becomes continuous and is described by the Fokker-Planck equation. When the parameter is nonvanishing, the expansion of the master operator in terms of it is, in three representative cases, a 'CD expansion' in products of creation and destruction operators for Hermite functions; the dominant term is usually the Fokker-Planck operator. These results are considered in relation to van Kampen's hypothesis for small-parameter expansions of the same operators. It is found that the CD expansion fits the available model processes exactly, and that these processes do not satisfy van Kampen's hypothesis. As a new application, the explicit CD series is given for the density fluctuation model. Special cases of the model include the density fluctuations studied by van Kampen and the Ehrenfest urn model. (Author)

AD-629 817 Fld. 12/1
CALIFORNIA UNIV SANTA BARBARA DEPT OF MATHEMATICS
PERMANENTS,
by Marvin Marcus, and Henryk Minc. 1963, 17p.
Contract AF-AFOSR-698-65,NSF-GP-1085
Proj. AF-9749, Task 974901,
AFOSR 65-2350
Unclassified report

Supported in part by grant AF-AFOSR-432-63.

Availability: Published in American Mathematical Monthly v72 n6 p577-91 Jun-Jul 1965. Copies to DDC users only.

Descriptors: (*Determinants, Matrix algebra), Combinatorial analysis, Functions, Bibliographies

This paper is concerned with a unified theory for the permanent function. The permanent function appears naturally in any combinatorial setting in which a count of the number of systems of distinct representatives of some configuration is required. For example, the permanent is the appropriate function for studying the classical problem of determining the total number of derangements of n distinct items. The permanent function is regarded herein as an analytic expression for the induced inner product in the symmetry class of completely symmetric tensors. Some of the major new results involving the function are obtained via this technique. Also included in this paper is an extensive history of the development of the subject over the last 153 years. There are a total of 15 conjectures stated in the paper, some of which are classical and some are printed here for the first time. (Author)

AD-629 866 Fld. 12/1
CARNEGIE INST OF TECH PITTSBURGH PA DEPT OF MATHEMATICS
A DIFFERENTIAL INEQUALITY,
by Zeev Nehari. 11 Jun 64, 9p. Contract AF-AFOSR-647-64,
AFOSR 65-2152
Unclassified report

Availability: Published in Journal D'Analyse Mathematique p297-302 1965. Copies to DDC users only.

Descriptors: (*Inequalities, Partial differential equations), Operators (Mathematics)

AD-629 873 Fld. 12/1, 20/4
CFSTI Prices: HC $2.00 MF $0.50
BOEING SCIENTIFIC RESEARCH LABS SEATTLE WASH MATHEMATICS RESEARCH LAB
APPLICATION OF THE THEORY OF HORMANDER TO FINDING THE FUNDAMENTAL SOLUTION OF HYPERBOLIC LINEAR PARTIAL DIFFERENTIAL EQUATIONS,
by F. Edward Ehlers. Dec 65, 30p. Rept. no. D1-82-0497 ,Mathematical Note-442
Unclassified report

Also available from the author.

Descriptors: (*Partial differential equations, Theorems), Operators (Mathematics), Integral transforms, Equations of motion, Fluid mechanics, Perturbation theory

A procedure following the theory of Hormander is explained for finding the fundamental solution to a hyperbolic linear partial differential equation with constant coefficients. The relevant theorems concerning hyperbolic operators are reviewed and the fundamental solutions are derived for the one and the two dimensional wave equations, and for the equation of small disturbances propagating in a uniform subsonic or supersonic stream. By means of these examples, it is demonstrated that Hormander's theory provides a clear and valuable procedure for obtaining the fundamental solution and for defining the region of integration of the convolution integral solution to the inhomogeneous partial differential equation. By the appropriate choice of inhomogeneous term, the solution to the Cauchy problem for the plane of initial time is easily found for each of the three partial differential equations considered. (Author)

AD-629 953 Fld. 12/1, 9/5
CFSTI Prices: HC $3.60 MF $0.50
RAND CORP SANTA MONICA CALIF
THE GENUS OF K12S,
by J. W. T. Youngs. Mar 66, 36p. Rept. no. RM-4759-PR,
Contract AF 49 (638)-1700,
Unclassified report

Descriptors: (*Algebraic geometry, Circuits), (*Circuits, Graphics), Electrical networks, Combinatorial analysis, Topology

This memorandum shows that K12s, the complete graph with 12s vertices, has genus (12s (2) - 7s + 1) and thus establishes a portion of the complete graph conjecture. (Author)

AD-629 964 Fld. 12/1, 20/4
HARVARD UNIV CAMBRIDGE MASS DIV OF ENGINEERING AND APPLIED PHYSICS
ANALYTIC APPROXIMATION TECHNIQUES IN APPLIED MATHEMATICS,
by George F. Carrier. 25 May 64, 29p.
Unclassified report

Availability: Published in J. Soc. Indust. Appl. Math. v13 n1 p68-95 Mar 1965. Copies to DDC users only.

Descriptors: (*Approximation (Mathematics), Integral equations), Boundary value problems, Fluid mechanics, Boundary layer, Heat transfer

AD-629 968 Fld. 12/1, 9/4
CFSTI Prices: HC $1.60 MF $0.50
LINCOLN LAB MASS INST OF TECH LEXINGTON
A SUMMARY, BY ILLUSTRATIONS, OF LEAST SQUARES FILTERS WITH CONSTRAINTS.
Technical note,
by Jon F. Claerbout. 31 Jan 66, 18p. Rept. no. TN-1966-7,
Contract AF 19 (628)-5167 ,ARPA Order-512
ESD TDR-66-22
Unclassified report

Descriptors: (*Least squares method, Information theory), Filters (Electromagnetic wave), Input-output devices, Series, Time

Several methods of combining a number of time series into a single series are discussed. They are all individual filtering followed by summation and are somewhat like Wiener filtering in that a least squares criterion is used to define the filter coefficients. They differ from Wiener filtering in that signal information is given in the form of various linear constraints on the filter coefficients rather than being given as a signal correlation function. The formulas are worked out explicitly for the case of two time series and three filter points and presented in such a way as to make generalization clear. (Author)

AD-629 976 Fld. 12/1, 22/3, 9/2
CFSTI Prices: HC $4.60 MF $0.50
PACIFIC MISSILE RANGE POINT MUGU CALIF
ERROR-BOUND METHODS FOR MULTIPLE-STATION DATA REDUCTION.
Technical memo.,
by R. W. Claassen, and C. J. Thorne. 4 Mar 66, 43p. Rept. no. PMR-TM-66-2,
Unclassified report

Descriptors: (*Space flight, Trajectories), (*Programming (Computers), Tracking), Errors, Least squares method, Data, Atmospheric refraction

A computer program and the related mathematical analysis is given for the calculation of accuracy bounds for the position of an object in space. The method involves the reduction of data from n-stations using the present PMR least-squares n-station method. (Author)

AD-630 039 Fld. 12/1
CFSTI Prices: HC $2.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
INEQUALITIES FOR NONLOCAL PARABOLIC AND HIGHER ORDER ELLIPTIC EQUATIONS.
Technical memo.,
by K. Gustafson, and V. Sigillito. Dec 65, 26p. Rept. no. TG-760,
Contract NOw-62-0604-c, Task A33D,
Unclassified report

Descriptors: (*Inequalities, Partial differential equations), (*Partial differential equations, Inequalities), Operators (Mathematics), Integral equations

A general method is illustrated for obtaining L (2) bounds for nonlocal problems by using known bounds for corresponding strictly differential problems. The method is applied to obtain L (2) and pointwise bounds for perturbed second order parabolic and fourth order elliptic problems. (Author)

AD-630 046 Fld. 12/1
CFSTI Prices: HC $2.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
POINTWISE BOUNDS FOR SOLUTIONS OF THE SECOND INITIAL-BOUNDARY VALUE PROBLEM FOR PARABOLIC EQUATIONS.
Technical memo.,
by V. G. Sigillito. Nov 65, 21p. Rept. no. TG-754,
Contract NOw-62-0604-c, Proj. A33,
Unclassified report

Descriptors: (*Boundary value problems, Partial differential equations), (*Partial differential equations, Boundary value problems), Operators (Mathematics), Inequalities, Functional analysis

An extension is given of the method to obtain pointwise bounds for the solutions of the first initial-boundary value problem for a semilinear parabolic equation. A method is given for obtaining interior pointwise bounds for solutions of the second initial-boundary value problem. The bounds obtained are in terms of L (2) integrals of the initial-boundary data; thus close bounds may be obtained, in the linear case, by applying the Rayleigh-Ritz Technique. The approximating functions used in the procedure need not satisfy either the dif-

ferential equation or the initial-boundary data but only certain regularity conditions. (Author)

AD-630 069 Fld. 12/1, 20/4
CFSTI Prices: HC $2.60 MF $0.50
BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD
TWO BOUNDARY VALUE PROBLEMS FROM THE THEORY OF HYPERBOLIC PARTIAL DIFFERENTIAL EQUATIONS WITH APPLICATIONS TO SUPERSONIC GAS FLOW,
by F. Frankl, and R. Aleksejeva. Jan 49, 24p. Rept. no. FILE-X-123, TT 66-60763

Unclassified report

Trans. of mono. Dve Kraevyh Zadaci iz Teorii Giperboliceskih Uravneii v Castnyh Proizvodnyh s Prilozeniem k Sverhzvukovym Gazovym Teceniyam, Moscow, 1934.

Descriptors: (*Boundary value problems, Supersonic flow), (*Supersonic flow, Boundary value problems), Gas flow, Partial differential equations, USSR

AD-630 090 Fld. 12/1
CFSTI Prices: HC $8.60 MF $0.75
RAND CORP SANTA MONICA CALIF
THE HEAWOOD MAP COLORING CONJECTURE,
by J. W. T. Youngs. Mar 66, 85p. Rept. no. RM-4752-PR, Contract AF 49 (638)-1700,

Unclassified report

Descriptors: (*Algebraic geometry, *Graphics), Topology, Colors

The four color conjecture for a sphere is a famous unsolved problem, and the only information available today is that the chromatic number of a sphere is either four or five. On the other hand, it has been known for threequarters of a century that the chromatic number of a torus is seven. The memorandum is concerned with the chromatic number of orientable two-manifolds of positive genus. The problem is not completely solved, but considerable progress has been made in the past few years. This study reports on current results and, above all, on methods that have been employed. (Author)

AD-630 096 Fld. 12/1, 20/10
MITRE CORP BEDFORD MASS
BOOLEAN EMBEDDINGS OF ORTHOMODULAR SETS AND QUANTUM LOGIC,
by Neal Zierler, and Michael Schlessinger. 14 Feb 64, 16p. Rept. no. TM-3557, Contract AF 19 (628) 2390, Proj. AF-708, ESD TDR-63-176

Unclassified report

Prepared in cooperation with The Institute for Defense Analyses, Princeton, N. J.

Availability: Published in Duke Mathematical Journal v32 n2 p251-62 Jun 1965. Copies to DDC users only.

Descriptors: (*Algebras, Set theory), (*Set theory, Algebras), (*Quantum mechanics, Mathematical logic), Algebra

Orthocomplemented sets are among the most common partial-order structures, and, among them, the Boolean algebras are the best known and have the richest structure. Other examples are the lattices of projections in uniformly closed self-adjoint algebras of operators on a Hilbert space, and certain combinatorial systems. An obvious way to construct orthocomplemented sets is to discard some of the elements of a Boolean algebra along with their orthocomplements. This paper shows that, in fact, every orthocomplemented set is obtained in this way. (Author)

AD-630 100 Fld. 12/1
CALIFORNIA UNIV LOS ANGELES
NORMAL OPERATORS AND UNIFORMLY ELLIPTIC SELF-ADJOINT PARTIAL DIFFERENTIAL EQUATIONS,
by Leo Sario, and Georges Weill. 24 Aug 64, 12p. Contract DA-ARO (D)-31-124-G499, AROD 1517:68

Unclassified report

Prepared in cooperation with Yale Univ., New Haven, Conn. under Grant NSF-G-19751.

Availability: Published in Transactions of the American Mathematical Society v120 n2 Issue 11 p225-35 Nov 1965. Copies to DDC users only.

Descriptors: (*Operators (Mathematics), Partial differential equations), (*Partial differential equations, Operators (Mathematics)), Boundary value problems, Complex variables, Functional analysis

AD-630 121 Fld. 12/1, 3/2
CFSTI Prices: HC $1.00 MF $0.50
RAND CORP SANTA MONICA CALIF
A NEW INITIAL VALUE METHOD FOR INTERNAL INTENSITIES IN RADIATIVE TRANSFER,
by H. H. Kagiwada, and R. E. Kalaba. Mar 66, 24p. Rept. no. RM-4906-PR, Contract AF 49 (638)-1700,

Unclassified report

Descriptors: (*Transport properties, Boundary value problems), (*Boundary value problems, Transport properties), Integral equations, Differential equations, Numerical analysis, Absorption (Physical), Scattering

An improved technique is presented for determining internal intensities for transport processes in finite slabs where absorption and multiple scattering occur. Traditional approaches involve solving either an unstable linear two-point boundary-value problem or a singular integral equation, both of which have computational drawbacks. This new method, however, has computational and analytical advantages, for it leads to the integration of an initial value problem for a system of ordinary differential equations, a suitable task for digital computers. Some typical results are presented as well as comparisons against other calculations. The authors also show how certain problems involving two-point boundary conditions or singular integral equations can be converted into stable initial-value problems, a major step in mathematical physics and engineering. (Author)

AD-630 156 Fld. 12/1
QUEEN'S UNIV BELFAST (NORTHERN IRELAND) DEPT OF APPLIED MATHEMATICS
QUADRATURE METHODS BASED ON THE EULER-MACLAURIN FORMULA AND ON THE CLENSHAW-CURTIS METHOD OF INTEGRATION,
by Francis J. Smith. 15 Mar 65, 7p. Contract N62558-4297,

Unclassified report

Availability: Published in Numerische Mathematik v7 p406-11 1965. Copies to DDC users only.

Descriptors: (*Integration, Numerical methods and procedures), (*Numerical methods and procedures, Integration), Series

The Euler-Maclaurin formula may be used to derive a wide range of quadrature formulas including the Newton-Cotes formulas. Some of these are derived, including two which are more accurate than Simpson's rule and which share some of its advantages. These are especially useful in the automatic evaluation of integrals which are badly behaved at their end points. The Clenshaw-Curtis method is also examined and it is shown to be considerably more accurate in practice than the equivalent trapezoidal rule even though the Clenshaw-Curtis method appears to converge to the trapezoidal rule as the number of abscissas approaches infinity. When the Clenshaw-Curtis formula is used in a way different from that put forward by the original authors it is suggested that it may have significant advantages over other methods of numerical integration in many problems. (Author)

AD-630 208 Fld. 12/1
MARYLAND UNIV COLLEGE PARK INST FOR FLUID DYNAMICS AND APPLIED MATHEMATICS
ON THE LOCATION OF SINGULARITIES OF A CLASS OF ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS FOUR VARIABLES,
by R. P. Gilbert. 10 Feb 64, 14p. Contract AF-AFOSR-400-64,NSF-GP-3937 Proj. AF-9749, Task 974901, . AFOSR 65-2114

Unclassified report

Availability: Published in Can. J. Math. v17 p676-86 1965. Copies to DDC users only.

Descriptors: (*Partial differential equations, Complex variables), Potential theory, Series, Operators (Mathematics)

The procedure used makes use of an integral operator which maps holomorphic functions of three complex variables onto harmonic functions of four variables. It is established that certain functions H (X), generated by the operator are regular provided that X is not contained in a given set of intersections.

AD-630 214 Fld. 12/1
PISA UNIV (ITALY)
EQUAZIONI ELLITTICHE DEL II ORDINE E SPAZI L (2, LAMBDA) SPACES. (SECOND ORDER ELLIPTIC EQUATIONS AND L (2, LAMBDA) SPACES,
by Sergio Campanato. 1965, 65p. Contract AF-EOAR-42-65, AFOSR 66-0267

Unclassified report

Availability: Published in Annali di Matematica v69 p321-82 1965. Copies to DDC users only.

Descriptors: (*Partial differential equations, Functional analysis), (*Functional analysis, Partial differential equations), Calculus of variations, Italy

Regularity results of Schauder type in the class of Holderian functions are proved for solutions of second order elliptic equations in the variational form. The method of proof followed makes use of the classes of functions L (2, lambda) which generalize the classes considered by Morrey, and whose properties in relation to Holder continuity are studied in some previous works. (Author)

AD-630 247 Fld. 12/1
CFSTI Prices: HC $1.00 MF $0.50
RAND CORP SANTA MONICA CALIF
QUASILINEARIZATION AND THE ESTIMATION OF DIFFERENTIAL OPERATORS FROM EIGENVALUES,
by R. E. Bellman, H. H. Kagiwada, R. E. Kalaba, and R. Vasudevan. Mar 66, 14p. Rept. no. RM-4915-PR, Contract AF 49 (638)-1700,

Unclassified report

Descriptors: (*Iterative methods, Differential equations), (*Differential equations, Iterative methods), Operators (Mathematics), Boundary value problems, Numerical analysis

Given a linear ordinary differential operator containing several unknown constants and a number of its eigenvalues, the values of the unknown constants are estimated. A precise formulation is provided, and an effective numerical procedure for solution is indicated. The results of some computational experiments are given.

AD-630 258 Fld. 12/1
CFSTI Prices: HC $1.60 MF $0.50
CATHOLIC UNIV OF AMERICA WASHINGTON D C DEPT OF MATHEMATICS
ON CHARACTERIZATION OF EMBEDDINGS AND QUOTIENT MAPS. PART II.
Technical rept.,
by Isidore J. Heller. 25 Feb 66, 15p. Rept. no. tr-660131,
Contract Nonr-4311 (00)
Unclassified report

See also AD-622 515.

Descriptors: (*Mapping (Transformations), Algebra), (*Algebra, Mapping (Transformations)), Set theory

Part II studies conditions entailing a point-free characterization, first of the class B of one-to-one onto maps, and subsequently of the classes of embeddings, quotient maps, one-to-one maps and of onto maps, in terms of B. (Author)

AD-630 266 Fld. 12/1
CFSTI Prices: HC $1.00 MF $0.50
RAND CORP SANTA MONICA CALIF
SOME NUMERICAL ASPECTS OF UNSTABLE FOUNDARY-VALUE PROBLEMS,
by R. E. Kalaba. Mar 66, 25p. Rept. no. RM-4944-PR,
Contract AF 49 (638)-1700,
Unclassified report

Descriptors: (*Boundary value problems, Numerical analysis), (*Numerical analysis, Boundary value problems), Transport properties, Control, Theory, Integral transforms

In various fields of application, including radiative transfer and automatic control, there is a need to integrate unstable linear systems of ordinary differential equations subject to two-point or multipoint boundary conditions. Special precautions must be taken to prevent the deleterious effects of the instability from manifesting themselves. The use of imbedding techniques, Laplace transforms, and concepts from control theory itself can prove efficacious, as some examples in this memorandum show. (Author)

AD-630 267 Fld. 12/1
CFSTI Prices: HC $2.00 MF $0.50
INSTITUTE OF MODERN LANGUAGES INC WASHINGTON D C
THE LEAST SQUARES METHOD BASED ON THE FUNDAMENTAL PRINCIPLES OF THE THEORY OF PROBABILITY,
by A. S. Chebotaryov. 1966, 35p. Contract DA-44-009-AMC-1563 (T), Proj. DA-4A013001A-91D
AERDL T-1822-66 ,TT 66-60810
Unclassified report

Trans. of mono. Sposob Naimenshikh Kvadratov s Osnovami Teorii Veroiatnostei, Moscow, 1958 p439-61, 571-7.

Descriptors: (*Least squares method, *Probability), Theory, USSR

AD-630 335 Fld. 12/1
CFSTI Prices: HC $4.00 MF $0.75
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
A PRIORI INEQUALITIES AND POINTWISE BOUNDS FOR SOLUTION OF CERTAIN ELLIPTIC AND PARABOLIC BOUNDARY VALUE PROBLEMS.
Technical memo.,
by V. G. Sigillito. Aug 65, 107p. Rept. no. TG-722,
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Inequalities, Boundary value problems), (*Boundary value problems, Inequalities), Operators (Mathematics), Partial differential equations

In this paper a method of Bramble and Payne is used to obtain a priori pointwise bounds at interior points for the solution of (i) the Dirichlet problem for a rather general second order nonlinear parabolic operator; (ii) the first boundary value problem for certain linear fourth order elliptic operators and (iii) the first initialboundary value problem for certain linear fourth order parabolic operators. In addition, a priori bounds for the energy integrals corresponding to the fourth order elliptic operators are derived. Since the bounds obtained are in terms of L2 integrals of the data (and, for the fourth order operators, derivatives of the data) the Rayleigh-Ritz technique may be employed in the linear problems to obtain close bounds.

AD-630 343 Fld. 12/1
CFSTI Prices: HC $3.60 MF $0.50
RAND CORP SANTA MONICA CALIF
EQUILIBRIUM PROCESSES,
by Sidney C. Port. Mar 66, 37p. Rept. no. RM-4896-PR,
Contract AF 49 (638)-1700,
Unclassified report

Descriptors: (*Statistical processes, Measure theory), Probability

Equilibrium processes of Markov processes on arbitrary state spaces are defined, and for certain subsets B of the state space we show that the strong law of large numbers and central limit theorem hold for (1) the total number of particles to visit B by time n, (2) the number of distinct particles to visit B by time n, and (3) the number of particles, which by time n leave B never to return. (Author)

AD-630 346 Fld. 12/1
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH WRIGHT-PATTERSON AFB OHIO
A MATRIX VERSION OF RENNIE'S GENERALIZATION OF KANTOROVICH'S INEQUALITY,
by B. Mond. 10 Mar 65, 5p. Rept. no. ARL-65-195,
Proj. AF-7071, Task 707100,
Unclassified report

Availability: Published in Proceedings of the American Mathematical Society v16 n5 p1131 Oct 1965. Copies to DDC users only.

Descriptors: (*Matrix algebra, Inequalities), (*Inequalities, Matrix algebra)

A Matrix Analogue of an Inequality of Rennie is given. This in turn leads to a very brief proof of the Matrix version of the well-known Kantorovich Inequality. (Author)

AD-630 396 Fld. 12/1
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATHEMATICS
ON THE SUBSPACE OF L (P) INVARIANT UNDER MULTIPLICATION OF TRANSFORM BY BOUNDED CONTINUOUS FUNCTIONS,
by Alessandro Figa-Talamanca. 30 Nov 64, 18p.
Contract AF-AFOSR-335-63,
AFOSR 66-0009
Unclassified report

Availability: Published in Rendiconti del Seminario Matematico della Universit&di Padova p176-89 1965. Copies to DDC users only.

Descriptors: (*Integral transforms, Functional analysis), (*Functional analysis, Integral transforms), Invariance, Fourier analysis

AD-630 397 Fld. 12/1
CALIFORNIA UNIV RIVERSIDE
SETS OF UNIQUENESS ON THE GROUP 2 (OMEGA),
by Richard B. Crittenden, and Victor L. Shapiro.
5 May 64, 17p. Contract AF-AFOSR-694-64, AFOSR 65-2131
Unclassified report

Availability: Published in Annals of Mathematics v81 n3 p550-64 May 1965. Copies to DDC users only.

Descriptors: (*Groups (Mathematics), Set theory), (*Series, Theorems), Measure theory, Functions, Sequences

AD-630 516 Fld. 12/1
CALIFORNIA UNIV SANTA BARBARA DEPT OF MATHEMATICS
MATRIX APPLICATIONS OF A QUADRATIC IDENTITY FOR DECOMPOSABLE SYMMETRIZED TENSORS,
by Marvin Marcus. 1965, 9p. Contract AF-AFOSR-698-65, Proj. AF-9749, Task 974901, AFOSR 65-2100
Unclassified report

Availability: Published in Bulletin of the American Mathematical Society v71 n2 p360-4 Mar 1965. Copies to DDC users only.

Descriptors: (*Matrix algebra, *Identities), (*Tenson analysis, Matrix algbra), Inequalities

AD-629 801 **See Fld. 5/2**

AD-629 816 **See Fld. 20/10**

AD-629 836 **See Fld. 9/2**

AD-629 877 **See Fld. 9/2**

AD-630 011 **See Fld. 20/3**

AD-630 079 **See Fld. 20/3**

AD-630 191 **See Fld. 5/1**

AD-630 257 **See Fld. 9/2**

AD-630 314 **See Fld. 5/10**

AD-630 391 **See Fld. 5/10**

AD-630 424 **See Fld. 9/2**

AD-630 447 **See Fld. 20/8**

AD-630 500 **See Fld. 9/5**

12/2. OPERATIONS RESEARCH

AD-629 814 Fld. 12/2
GRUMMAN AIRCRAFT ENGINEERING CORP BETHPAGE N Y RESEARCH DEPT
CONCERNING ADJOINTS OF DISCRETE-TIME SYSTEMS.
Revised ed.,
by E. Kreindler, and P. E. Sarachik. 25 Mar 65, 3p. Contract AF49 (638)-1207, AFOSR 65-2354
Unclassified report

Revision of manuscript submitted 11 Dec 64. Prepared in cooperation with New York Univ., N. Y., Dept. of Electrical Engineering, Grant AF-AFOSR-747-65.

Availability: Published in EIEEE Transactions on Automatic Control vAC-10 n3 p350-2 Jul 1965. Copies to DDC users only.

Descriptors: (*Control systems, Linear systems), (*Time-lag theory, Control systems), Operators (Mathematics), Matrix algebra

It is shown that an adjoint to a discrete-time system having all the properties of the adjoint to a continuous -time system cannot be found. (Author)

AD-629 855 Fld. 12/2
MINNESOTA UNIV MINNEAPOLIS INST OF TECH
A COMPUTATIONAL TECHNIQUE FOR OPTIMAL SYSTEMS,
by E. B. Lee. 11 Feb 65, 3p. Contract AF-AFOSR-571-64, AFOSR 65-2339
Unclassified report

Availability: Published in IEEE Transactions on Automatic Control vAC-10 n3 p368-9 Jul 1965. Copies to DDC users only.

Descriptors: (*Optimization, Control systems), Differential equations, Matrix algebra

AD-629 894 Fld. 12/2
CFSTI Prices: HC $2.00 MF $0.50
VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ECONOMICS
EXPERIMENTAL METHODS IN QUADRATIC PROGRAMMING.
Research memo.,
by J. H. Moore, and A. B. Whinston. Feb 66, 41p. Rept. no. ONR-RM-4,
Contract Nonr-4811 (00) Proj. NR-047-056,
Unclassified report

Descriptors: (*Quadratic programming, Algorithms), (*Algorithms, Quadratic programming), Experimental design, Iterative methods

This paper considers a class of algorithms for solving quadratic programming problems. An attempt is made to rank the various procedures. Computational results are given and a discussion of the results is presented. (Author)

AD-629 907 Fld. 12/2
CFSTI Prices: HC $1.10 MF $0.50
RAND CORP SANTA MONICA CALIF
MAXIMUM LIKELIHOOD ESTIMATION OF THE PARAMETERS OF A GEOMETRICALLY COMPOUNDED POISSON PROCESS,
by Robin B. S. Brooks. Mar 66, 7p. Rept. no. P-3327,
Unclassified report

Descriptors: (*Statistical processes, Inventory analysis), (*Inventory analysis, Statistical processes), Geometry, Distribution theory

AD-629 920 Fld. 12/2
CFSTI Prices: HC $3.60 MF $0.50
RAND CORP SANTA MONICA CALIF
CONTRACTION MAPPINGS IN THE THEORY UNDERLYING DYNAMIC PROGRAMMING,
by Eric V. Denardo. Mar 66, 32p. Rept. no. RM-4755-PR,
Contract AF 49 (638)-1700,
Unclassified report

Descriptors: (*Dynamic programming, Optimization), (*Optimization, Dynamic programming), (*Mapping (Transformations), Dynamic programming), Decision theory, Model theory

This memorandum is concerned with the formulation and analysis of a broad class of optimization problems including many, but not all, dynamic programming problems. The formulation generalizes those of several authors and provides further insight into the class of problems which satisfy Bellman's Principle of Optimality. Three widely shared properties of optimization problems are abstracted; they are called 'contraction,' 'monotonicity,' and 'N-stage contraction' properties. Analysis is conducted of those classes of problems satisfying the first property, the first two properties, and the last two properties. In each case, a fixed-point argument guarantees that a functional equation have a unique solution; in the latter two cases that solution is the optimal return function. Policies whose return functions attain or approximate the fixed point are shown to exist, and three techniques for determining such policies are presented. The techniques are successive approximations, mathematical programming, and a generalization of one of Howard's policy improvement routines. Certain issues concerning history-remembering decision procedures and stationary processes are settled. Examples are provided, and apparent integrability issues in some of them are circumvented. (Author)

AD-630 047 Fld. 12/2
CFSTI Prices: HC $1.60 MF $0.50
HEBREW UNIV JERUSALEM (ISRAEL) DEPT OF MATHEMATICS
KERNELS OF SUPERADDITIVE SIMPLE 5-PERSON GAMES THAT ARE NOT WEIGHTED MAJORITY GAMES.
Research memo.,
by Robert J. Aumann, Philip Rabinowitz, and David Schmeidler. Jan 66, 11p. Rept. no. RM-18,
Contract N62558-4355, Proj. NR-047-045,
Unclassified report

Prepared in cooperation with The Weizmann Inst. of Science, Rehovot (Israel). Research Program in Game Theory and Mathematical Economics.

Descriptors: (*Game theory, Groups (Mathematics)), Set theory, Bargaining, Israel

All the games described in the title are tabulated, together with their kernels. Also tabulated are the symmetry groups of the games and various other identifying characteristics. (Author)

AD-630 119 Fld. 12/2
CFSTI Prices: HC $2.60 MF $0.50
OPERATIONS RESEARCH CENTER UNIV OF CALIF BERKELEY
ON THE KUHN-TUCKER THEOREM.
Revised ed.,
by Jean Abadie. Feb 66, 27p. Rept. no. ORC-65-18,
Contract Nonr-222 (83),DA-31-124-ARO (D)-331 Proj. NR-047-033,
Unclassified report

Revision of manuscript submitted Jun 65.

Descriptors: (*Theorems, Mathematical programming), (*Linear programming, Theory), Optimization

The general programming problem considered has the form: minimize f (x) subject to g sub i (x) = o, i = 1,2,..., m. The regularity condition of Cottle is first generalized so that any linear system satisfies a (new) regularity condition. It is then proven that this regularity condition is actually a sufficient criterion for a certain weakened form of the Kuhn-Tucker constraint qualification property. Finally, a further generalization of the latter property is given. (Author)

AD-630 120 Fld. 12/2
CFSTI Prices: HC $1.00 MF $0.50
OPERATIONS RESEARCH CENTER UNIV OF CALIF BERKELEY
COMPACT BASIS TRIANGULARIZATION FOR THE BLOCK ANGULAR STRUCTURES.
Research rept.,
by Romesh Saigal. Jan 66, 22p. Rept. no. ORC-66-1,
Contract Nonr-222 (83),PHS-GM-9606-05 Proj. NR-047-033 ,RR-003-07-01
Unclassified report

Descriptors: (*Linear programming, Matrix algebra), (*Matrix algebra, Linear programming), Combinatorial analysis, Permutations, Scheduling

Dantzig has shown in (AD-286 897) how a triangularized substitute inverse could be used in a staircase structured linear program. The present note is motivated by the same approach but applied to block angular structures. Block angular structures have special properties which can effectively be used to update the triangularized substitute inverse and the compact E-structure. The method of updating consists of performing a cyclic permution and a set of elementary operations on both the present T and the E-structure to obtain the new T and new E-structure. This paper presents the special properties and the method of updating. (Author)

AD-630 148 Fld. 12/2, 5/11
CFSTI Prices: HC $1.00 MF $0.50
SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
SIMULATION TECHNIQUES AND THEIR APPLICATION,
by Maria Davidson, and Ellis Scott. 19 Jul 63, 9p. Rept. no. SP-1133,
Unclassified report

Prepared for presentation at the 1963 Meetings of the American Sociological Association, Section on Methodology, Los Angeles, Calif. 27 Aug 1963.

Descriptors: (*Simulation, Scientific research), Mathematical models, Game theory, Operations research, Social sciences, Behavior

The purpose of this paper is to review briefly some of the more important simulation techniques and their applications. Special emphasis is given to current research in the behavioral sciences which involves the use of electronic computers. It is hoped that this paper will indicate the potential fruitfulness of computer simulation techniques in social research. The technique has been utilized for leadership training and as a clinical tool in Moreno's psychodrama. Early development of games, such as chess, was another form of simulation. In chess, battle situations were simulated and opponents sought to develop a strategy, according to certain rules, that would enable them to realize the greatest expected payoff. These gaming techniques became useful as a means for testing alternative plans for action. The second stage for simulation is that of modeling for scientific purposes. Its aim is that of creating certain conditions in a controlled setting. By doing so, it provides a close look at phenomena that cannot be observed with accuracy outside of the simulated situation. A third stage in the development of simulation appears to focus on creating the surrounding stimuli to give man an opportunity to familiarize himself with and learn to cope with new situations. The fourth stage of simulation, made possible by the advent of the computer, is characterized by the development of a system simulation involving people and equipment functioning in an integrated way to achieve specific objectives. The most recent developments in simulation are further extensions of simulating the human being. At present there are attempts being made to create computer simulations of higher mental processes of human beings.

AD-630 149 Fld. 12/2, 5/8
CFSTI Prices: HC $1.00 MF $0.50
SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
THE USE OF SIMULATION IN THE DEVELOPMENT OF MAN-MACHINE SYSTEMS,
by Maria Davidson. 16 Sep 63, 22p. Rept. no. SP-1137,
Unclassified report

Descriptors: (*Man-machine systems, Simulation), (*Simulation, Man-machine systems), Mathematical models, Operations research, Laboratory equipment

Several simulation techniques used in man-machine system development are described. However, the main emphasis is on a special type of laboratory simulation frequently used in the study of systems at the Paramus Facility of the System Development Corporation. The advantages and short-

comings of this technique are discussed. Furthermore, the procedures developed for studying a problem in the Simulation Laboratory are presented. The physical description of the Simulation Laboratory, its functions and personnel that care for the laboratory are presented in the Appendix of the paper. (Author)

AD-630 300 Fld. 12/2, 9/2
CFSTI Prices: HC $2.60 MF $0.50
RAND CORP SANTA MONICA CALIF
IDENTIFICATION FROM APERIODIC DISCRETE-TIME DATA WITH APPLICATIONS TO THE ESTIMATION OF EXPONENTIAL PARAMETERS,
by Allen Klinger. Mar 66, 21p. Rept. no. RM-4919-PR,
Contract AF 49 (638)-1700,
Unclassified report

Descriptors: (*Identification, Input-output devices), Real time, Adaptive control systems, Data processing systems, Functions, Integration, Integral transforms, Linear systems

A method for the identification of a single-input single-output time-invariant linear system from an arbitrary set of discrete-time observations is described. Interpolatory procedures are used to express the unknown parameters in terms of the data. Applications of the procedure to an overdamped second-order system are included and the identification method is shown related to the resolution of a set of discrete-data into a weighted sum of exponentials, and hence to Prony's method for equally-spaced discrete-data. The results compare well with those of other methods when linear interpolation is used to obtain the equally-spaced or other special data required by alternate procedures. Computer results indicate that the procedure can be used to identify systems when only limited quantities of aperiodic data are available, and that it could be used in a comprehensive digital computer program for identification for an adaptive control system. (Author)

AD-630 304 Fld. 12/2, 9/2
CFSTI Prices: HC $1.60 MF $0.50
STANFORD RESEARCH INST MENLO PARK CALIF
FURTHER RESULTS ON SUBDIRECTLY IRREDUCIBLE UNARY ALGEBRAS,
by M. Yoeli. 15 Jan 66, 15p. Rept. no. Scientific-5,
Contract AF 19 (628)-5092, Proj. AF-4641, Task 464101,
AFCRL 66-66
Unclassified report

Prepared in cooperation with Technion - Israel Inst. of Tech., Haifa. See also AD-624 578.

Descriptors: (*Algebras, Graphics), (*Automata, Algebras), Algebraic topology, Mathematical logic, Transformations (Mathematics)

Irreducibility conditions for non-connected unary algebras are established. Irreducible representations of unary algebras are demonstrated to be non-unique and a computational method for obtaining an irreducible representation of an arbitrary basic algebra is derived. Furthermore, the concept of decomposability is introduced and related to that of reducibility. A unary algebra is decomposable if it can be non-trivially represented as the homomorphic image of a subalgebra of the direct product of two other unary algebras. (Author)

AD-629 879 See Fld. 15/7

AD-630 097 See Fld. 5/1

AD-630 197 See Fld. 13/8

Field 13-MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

AD-629 998 Fld. 13
COLUMBIA UNIV NEW YORK COLL OF PHYSICIANS AND SURGEONS
EFFECT OF HYDROXYUREA ON VIRUS DEVELOPMENT. I. ELECTRON MICROSCOPIC STUDY OF THE EFFECT ON THE DEVELOPMENT OF BACTERIOPHAGE T4,
by William Margaretten, Councilman Morgan, Herbert S. Rosenkranz, and Harry M. Rose. 2 Sep 65, 12p. Contract Nonr-266 (89), Proj. NR-103-574,
Unclassified report

Availability: Published in Journal of Bacteriology v91 n2 p823-33 Feb 1966. Copies to DDC users only.

Descriptors: (*Bacteriophages, Growth), (*Desoxyribonucleic acids, Synthesis), Viruses, Electron microscopy, Histological techniques, Morphology (Biology), Culture media, Viability, Cytology, Germicides

Double fixation in gluteraldehyde and osmium tetroxide and the application of lead staining revealed details of viral structure not previously observed in thin sections. Bacteriophage presumed to have injected its deoxyribonucleic acid (DNA) exhibited a dense, hollow, disc-shaped core. Within the cytoplasm of infected bacteria, the peripheral membrane of the viral heads was clearly visible. Aberrant forms containing the hollow core and believed to be devoid of DNA were encountered in studies of the normal course of development. Hydroxyurea, which is believed to interfere with the production of infective bacteriophage by inhibting DNA synthesis, resulted in the appearance of viral particles with the hollow disc or with bizarre, distorted cores. However, a significant number of viral heads looked entirely normal and presumably contained a full complement of DNA. Hypotheses are presented to explain these observations. (Author)

13/1. AIR CONDITIONING, HEATING, LIGHTING, AND VENTILATING

AD-629 990 Fld. 13/1, 13/9, 14/2
CFSTI Prices: HC $4.60 MF $0.50
IMC MAGNETICS CORP WESTBURY N Y
DEVELOPMENT OF COOLING DEVICE.
Interim development rept., 1 Oct-31 Dec 65. 31 Dec 65, 48p. Contract NObsr-93424,
Unclassified report

See also AD-625 140.

Descriptors: (*Cooling fans, Axial-flow fans), (*Miniature electronic equipment, Cooling), Naval equipment, Gas bearings, Test equipment, Gas flow, Journal bearings, Performance (Engineering), Design, Mechanical drawings, Miniature electrical equipment, Electric motors

The report details progress in the following areas: (1) Development of a miniature vaneaxial fan with improved air delivery and efficiency. Various configurations are shown and results detailed. (2) Design and development of a motor suitable for driving the vaneaxial fan. One design using existing laminations has been checked out, and a new lamination has been designed. (3) Since the air bearing design is contingent on the lamination configuration, work on the air bearing has been temporarily halted until a motor lamination figure has been arrived at. (Author)

AD-630 216 See Fld. 20/6

AD-630 423 See Fld. 18/6

13/2. CIVIL ENGINEERING

AD-630 146 Fld. 13/2, 9/2
CFSTI Prices: HC $1.60 MF $0.50
SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
SYSTEM CONSIDERATIONS IN BUILDING A METROPOLITAN DATA BANK FOR URBAN RESEARCH,
by Herbert H. Isaacs. 29 Jun 62, 11p. Rept. no. SP-862,
Unclassified report

Descriptors: (*Urban planning, Data storage systems), Data, Systems engineering, Data processing systems, California

Contents: The urban area as a system; urban system improvement program; the data bank as a management information system. (Prepared in conjunction with the proposed automated metropolitan data bank for the greater Los Angeles area)

AD-630 205 See Fld. 14/2

AD-630 206 See Fld. 14/2

AD-630 261 See Fld. 14/2

AD-630 325 See Fld. 5/1

13/3. CONSTRUCTION EQUIPMENT, MATERIALS AND SUPPLIES

AD-630 066 Fld. 13/3
CFSTI Prices: HC $1.00 MF $0.50
ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG MISS
LABORATORY FREEZING-AND-THAWING TESTS OF CONCRETE,
by Bryant Mather. Apr 65, 18p. Rept. no. Miscellaneous paper-6-716,
Unclassified report

Descriptors: (*Concrete, Environmental tests), Melting, Test methods, Experimental data, Freezing

Tests performed in order to select a combination of aggregate and cement that would yield concrete of good resistance to rapid freezing-and-thawing in the laboratory are described. Alternative methods of calculating the results of such tests are given and the differences are indicated. The differences in results from tests of presumably similar concrete specimens are regarded as having been caused by differences in the cements used rather than differences in the aggregates, even though differences in the aggregates were detected. (Author)

AD-630 435 See Fld. 13/6

13/4. CONTAINERS AND PACKAGING

AD-629 876 See Fld. 13/10

AD-630 325 See Fld. 5/1

13/6. GROUND TRANSPORTATION EQUIPMENT

AD-630 435 Fld. 13/6, 13/3
CFSTI Prices: HC $1.60 MF $0.50
ARMY ENGINEER RESEARCH AND DEVELOPMENT LABS FORT BELVOIR VA
TESTING OF DRIVELESS HUBODOMETERS.

Interim rept., Nov 64-Oct 65,
by Robert C. Watson. Jan 66, 13p. Rept. no. 1846,
Task 1M643303D54901,
Unclassified report

Descriptors: (*Vehicle instruments, Tests), Environmental tests, Earth-handling equipment, Wheel hubs, Counting methods, Installation

The report covers the testing of three samples of revolution counters designated as Driveless Hubodometers. All three samples of the revolution counters were installed and tested on a Caterpillar Model 12E motor grader. The results of the endurance test indicate that the revolution counters would perform satisfactorily when installed on pneumatic-tire type of equipment. The results of the accuracy tests indicate that the revolution counters would be of limited benefit when installed on equipment traveling relatively short distances. On equipment traveling long distances (500 to 1,000 miles), the counters would have a high degree of accuracy and would prove to be beneficial. (Author)

AD-630 325 **See Fld. 5/1**

13/8. INDUSTRIAL PROCESSES

AD-629 861 Fld. 13/8, 11/3, 13/10
CFSTI Prices: HC $1.00 MF $0.50
DEPARTMENT OF THE NAVY WASHINGTON D C
A MECHANIZED METHOD OF COATING PROPELLER SHAFTS WITH A REINFORCED EPOXY RESIN,
by Yu. Razdrogin. 1966, 7p. Rept. no. Translation-2055,
TT 66-60753
Unclassified report

Mekhanizirovannyi Sposob Pokrytiya Grebnykh Valov Armirovannoi Epoksidnoi Smoloi, trans. of Rechnoi Transport (USSR) n11 p47-8 1964.

Descriptors: (*Coatings, Shafts), (*Propellers (Marine), Shafts), (*Shafts, Coatings), Processing, Machines, Reinforcing materials, Glass textiles, Tapes, Corrosion inhibition, Epoxy plastics, USSR, Plastic coatings

AD-629 908 Fld. 13/8, 22/2, 11/2
CFSTI Prices: HC $1.00 MF $0.50
ARMY MATERIALS RESEARCH AGENCY WATERTOWN MASS MATERIALS ENGINEERING DIV
MICROWAVE INSPECTION TECHNIQUES FOR DETERMINING ABLATIVE SHIELD THICKNESS AND CERAMIC MATERIALS PROPERTIES.
Technical rept.,
by Rudolph V. Giangrande. Dec 65, 21p. Proj. PEMA-15021, Task 56231,
AMRA TR-65-31
Unclassified report

Descriptors: (*Ceramic materials, Non-destructive testing), (*Non-destructive testing, Microwaves), Heat shields, Ablation, Thickness, Reentry vehicles, Microwave equipment, Dielectric properties, Attenuation, Wave transmission, Reflection, X band, Coatings

The report presents an application of microwave technology as applied to material evaluation. A reflectometry system for the measurement of ablative shield thickness is described and experimental procedures and results examined. A method of transmission loss measurements for the evaluation of several ceramic materials is included and experimental procedures and results discussed. (Author)

AD-629 946 Fld. 13/8, 9/1
CFSTI Prices: HC $1.60 MF $0.50
NAVAL AVIONICS FACILITY INDIANAPOLIS IND
BONDING OF COMPONENT LEADS AND WIRE CONDUCTORS TO THIN FILM CIRCUITS BY ULTRA-SONIC WELDING.
Final rept., 1965,
by Orville W. Slone, and William M. Shank. 15 Mar 66, 14p. Rept. no. NAFI-TR-764,
Proj. 23-26-65,
Unclassified report

Descriptors: (*Ultrasonic welding, Circuit interconnectors), (*Circuit interconnectors, Ultrasonic welding), (*Metal films, Ultrasonic welding), Weldability, Films, Electric wire, Bending, Manufacturing methods, Test metds

The results of limited tests to determine the weldability of small component lead wires to thin film circuits by ultrasonic welding techniques are reported. (Author)

AD-629 973 Fld. 13/8
CFSTI Prices: HC $1.00 MF $0.50
ARMY WEAPONS COMMAND ROCK ISLAND ILL RESEARCH AND ENGINEERING DIV
AN EVALUATION OF THE ULTRASONIC MACHINING PROCESS.
Technical rept.,
by Lanny D. Wells. Feb 66, 22p. Rept. no. ria-66-526,
Proj. PEMA-66261,
Unclassified report

Descriptors: (*Machining, Ultrasonic radiation), (*Ultrasonic radiation, Machining), Effectiveness, Vibration

An evaluation of the ultrasonic machining process was made based on experience with a commercial unit and an intensive literature review. Ultrasonic machining is a practical solution to some machining tasks which are difficult because of workpiece characteristics or because of a requirement for a complex shape or profile in the finished part. However, because of the low machining rates obtainable and other disadvantages of the process, it is limited to machining operations for which no other satisfactory method can be found. (Author)

AD-630 001 Fld. 13/8, 9/1
CFSTI Prices: HC $2.00 MF $0.50
HAMILTON STANDARD DIV UNITED AIRCRAFT CORP WINDSOR LOCKS CONN
ELECTRON BEAM TECHNIQUES FOR FABRICATION AND ASSEMBLY OF PARTS FOR ELECTRON TUBES.
Quarterly rept. no. 10, 1 Oct-31 Dec 65,
by M. L. Kohn. 31 Dec 65, 39p. Rept. no. ebr-83,
Contract DA-36-039-AMC-03625 (E),
Unclassified report

See also AD-628 170.

Descriptors: (*Electron tube parts, Manufacturing methods), (*Electron beam welding, Manufacturing methods), (*Machining, Electron beams), Electron tubes, Acceptability

The program objectives and a concise summary of the program history are presented. Progress during this reporting period relevant to manufacturing and evaluating preproduction and pilot line 6914 tubes and the completion of all activities and shipment of the 6544 tubes is discussed. Proposed objectives for the remainder of the program are outlined. (Author)

AD-630 131 Fld. 13/8, 15/5
CFSTI Prices: HC $6.00 MF $1.50
MARTIN CO ORLANDO FLA
MAINTAINABILITY ENGINEERING,
by Gordon Bissell. 1965, 275p. Contract DA-31-124-ARO (D)-100-34,
Unclassified report

Prepared in cooperation with Duke Univ., Durham, N. C.

Descriptors: (*Maintainability, Textbooks), Production control, Maintenance, Design, Human engineering, Engineering, Performance (Engineering), Analysis

This text has been developed to satisfy several objectives. The first objective is to satisfy the requirement for a textbook, to be used in university curricula, that will acquaint future engineers with the requirements for maintainability in the products they may eventually design. The second objective is to provide a standard textbook for use by practicing engineers who may wish, through self-study, to expand the boundaries of their professional thinking. The third of these is to provide a standard reference work for use by: Contracting personnel, who must specify and define the product requirements. Design engineers, who must choose the parts and integrate them into operational systems that meet product requirements. Maintainability engineers, who must assure their companies and the customers that the products represent not only the optimum for satisfying the demands of the market, but also that they will survive in their environment.

AD-630 197 Fld. 13/8, 12/2, 5/1
CFSTI Prices: HC $7.60 MF $0.75
STANFORD UNIV CALIF DEPT OF INDUSTRIAL ENGINEERING
OPTIMAL POLICY FOR A DYNAMIC MULTI-ECHELON INVENTORY MODEL.
Technical ret.,
by Stuart A. Bessler, and Arthur F. Veinott,Jr..
23 Feb 66, 74p. Rept. no. TR-5,
Contract Nonr-225 (77), Proj. NR-347 010 ,NR-347-001
Unclassified report

Prepared in cooperation with Decision Studies Group, Palo Alto, Calif., Contract Nonr-4457 (00). See also AD-618 408.

Descriptors: (*Optimization, Inventory analysis), (*Inventory analysis, Optimization), Stock level control, Inventory control, Model theory, Management planning

A general multiperiod multi-echelon supply system consisting of n facilities each stocking a single product is studied. At the beginning of a period each facility may order stock from an exogenous source with no delivery lag and proportional ordering costs. During the period the (random) demands at the facilities are satisfied according to a given supply policy that determines to what extent stock may be redistributed from facilities with excess stock to those experiencing shortages. There are storage, shortage, and transportation costs. An ordering policy that minimizes expected costs is sought. If the initial stock is sufficiently small and certain other conditions are fulfilled, it is optimal to order up to a certain base stock level at each facility. The special supply policy in which each facility except facility 1 passes its shortages on to a given lower numbered facility called its direct supplier is examined in some detail. Bounds on the base stock levels are obtained. It is also shown that if the demand distribution at facility j is stochastically smaller ('spread' less) than that at another facility k having the same direct supplier and if certain other conditions are fulfilled, then the optimal base stock level ('virtual' stock out probability) at j is less than (greater than) or equal to that at facility k. (Author)

AD-630 204 Fld. 13/8, 11/6
CFSTI Prices: HC $3.00 MF $0.75
MECHANICAL TECHNOLOGY INC LATHAM N Y
FRICTION AND LUBRICATION IN HOT METAL DEFORMATION.
Technical rept.,
by M. B. Peterson, and F. F. Ling. 20 Mar 66, 98p. Rept. no. MTI-66TR18,
Contract NOw-65-0363-c,
Unclassified report

Descriptors: (*Mechanical working, Friction), (*Friction, Hot working), (*Deformation, Friction), (*Lubrication, Mechanical working), Test methods, Foils, Surface properties

A study was conducted to investigate the frictional behavior of metals in hot metal deformation. The purpose of the study was to gain a better understanding of friction at high pressures and temperatures characteristic of metal-working processes. A test technique was developed in which a thin foil was compressed between a hardened anvil and a flat plate. Friction was determined by applying a tangential force to one of the specimens. A technique was also developed to evaluate lubricants based upon the surface deformation they would withstand. These techniques were used to measure the coefficient of friction and surface damage of various pure metals and alloys in both the lubricated and the unlubricated condition, at temperatures to 1800 F and pressures to 200,000 psi. It was found that this test uniquely yielded the friction coefficient of a given metal combination at a particular pressure and interface temperature. The variables found to be most significant in the pressure range 8000 to 200,000 psi are the roughness, temperature, surface oxide, and tool materials. Over this pressure range, friction is primarily determined by the strength of the metal. Adhesion effects modify the friction but primarily determine the extent of metal transfer.

AD-630 248 Fld. 13/8
CFSTI Prices: HC $1.60 MF $0.50
NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF
THE APPLICATION OF ULTRASONICS TO WIRE DRAWING.
Quarterly progress rept. no. 1, 1 Jul-30 Sep 65,
by A. T. Robinson, J. C. Connelly, and L. M. Stayton. Nov 65, 12p. Rept. no. NOTS-TP-3976, TPR-420
Task RRMA-24-051/216-1/R007-01-01,
Unclassified report

Descriptors: (*Wire, Drawing (Machine processing)), (*Drawing (Machine processing), Ultrasonic radiation), (*Ultrasonic radiation, Drawing (Machine processing)), Material forming, Creep, Deformation, Loading (Mechanics), Yield point, Copper

Tests to measure draw load reduction versus draw velocity at a constant energy density were repeated for tinned copper wire. It was found that with a pure sine wave input at the resonant frequency (nominally 20 kilocycles per second) of the system, that parasitic frequencies were self-induced in the wire. The pattern and distribution of energies among the various waves were responsible for further decreases in draw load. (Author)

AD-630 440 Fld. 13/8, 11/6
CFSTI Prices: HC $6.00 MF $1.25
BATTERSEA COLL OF TECHNOLOGY LONDON (ENGLAND)
ACTIVATION SINTERING OF TUNGSTEN AND ITS EFFECT ON SOME MECHANICAL PROPERTIES.
Final rept. 1 Oct 62-31 Dec 65 (Doctoral thesis),
by I. J. Toth. Nov 65, 234p. Contract N62558-3391,
Unclassified report

Also includes Use of Reactive Atmospheres for the Treatment of B.C.C. Metals.

Descriptors: (*Sintering, *Tungsten), Controlled atmospheres, Hydrogen, Bromine, Halogens, Density, High-temperature research, Nickel compounds, Palladium compounds, Salts, Brittleness, Mechanical properties, Heat of activation, Phase studies, Tables

The work is concerned with improvements in the sintering properties of Tungsten. Two methods of 'activation sintering' are studied, halogen activation and metallic activation. An example of the first is the use of hydrogen and bromine as sintering atmosphere. No significant increase in densification was noted, except for a moderate improvement at temperatures around 1400C. However, some beneficial effects were observed, notably in the rounded shape of the pores and in lowering the oxygen content. This led to an improvement in mechanical properties. Metallic activation, mainly provided by nickel and palladium salts led to high densities at a sintering temperature of 1100C but was accompanied by increased brittleness. This undesirable feature could be in part offset by controlling the amount of metallic activator and by some suitable subsequent heat-treatment. The two types of processes are discussed seperately, some appropriate mechanisms are proposed to explain the results observed, and the theoretical implications are considered. (Author)

AD-630 464 Fld. 13/8, 11/6
CFSTI Prices: HC $1.00 MF $0.50
NAVY MARINE ENGINEERING LAB ANNAPOLIS MD
EFFECT OF TEMPERING ON THE STRENGTH, HARDNESS, AND NOTCH TOUGHNESS OF HY-130/150, 5NI-CR-MO-V STEEL,
Phase rept.,
by W. H. Asche, and M. R. Gross. Mar 66, 22p. Rept. no. MEL-72/56,
Proj. S-F020-01-01, Task 0720,
Unclassified report

Descriptors: (*Steel, Tempering), (*Tempering, Steel), Nickel alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys, Toughness, Tensile properties, Impact tests, Hardness, Temperature, Metal plates, Mechanical properties, Microstructure

The effect of tempering in the range of 900 to 1150 F on the tensile propeties, hardness, and Charpy V-notch toughness of HY-130/150, 5Ni-Cr-Mo-V steel was investigated. The investigation confirmed high tempering resistance claimed for the steel. The strength and hardness properties were found to be similar over a tempering range of 900 to 1050 F. The notch toughness, however, increased with increasing tempering temperature. (Author)

AD-630 490 Fld. 13/8, 14/2
CFSTI Prices: HC $1.00 MF $0.50
NAVAL AIR DEVELOPMENT CENTER JOHNSVILLE PA AERO-ELECTRONIC TECHNOLOGY DEPT
QUALITY CONTROL FOR TRANSDUCER CERAMICS.
Phase rept.,
by M. F. Pressler. 21 Mar 66, 11p. Rept. no. NADC-AE-6608,
Task ASW213000/2021/F101-13-01, R360FR102/2021/R011-01-01
Unclassified report

Descriptors: (*Piezoelectric transducers, Quality control), (*Ceramic materials, Piezoelectric transducers), (*Quality control, Piezoelectric transducers), Piezoelectric effect, Test equipment, Transducers

A detailed description of the construction and operation of a piezoelectric constant tester for transducer ceramics is given. (Author)

AD-629 862 See Fld. 11/3

AD-629 893 See Fld. 9/1

AD-629 912 See Fld. 11/11

AD-629 913 See Fld. 9/1

AD-629 918 See Fld. 11/8

AD-629 930 See Fld. 9/1

AD-630 058 See Fld. 14/2

AD-630 113 See Fld. 11/6

AD-630 129 See Fld. 11/6

AD-630 195 See Fld. 9/1

AD-630 196 See Fld. 9/1

AD-630 252 See Fld. 9/1

AD-630 253 See Fld. 9/1

AD-630 317 See Fld. 9/1

AD-630 358 See Fld. 19/1

AD-630 359 See Fld. 11/4

AD-630 408 See Fld. 14/2

AD-630 427 See Fld. 11/6

AD-630 437 See Fld. 9/1

13/9. MACHINERY AND TOOLS

AD-630 283 Fld. 13/9, 11/3
CFSTI Prices: HC $1.10 MF $0.50
DEPARTMENT OF THE NAVY WASHINGTON D C
SYNTHETIC MATERIALS IN SHIP CONSTRUCTION AND REPAIR,
by Yu. V. Afanasev, and A. Ya. Derzhavets. 1966, 6p. Rept. no. Translation-2107, TT 66-60815
Unclassified report

Sinteticheskie Materialy v Sudostroenie i Sudoremonte, trans. of mono. Morskoi Transport, Moxcow, 1962 p57-62.

Descriptors: (*Ship decks, Coatings), (*Coatings, Ship decks), USSR, Protective treatments, Corrosion inhibition, Fire resistant coating, Plastic coating, Rubber coatings

AD-629 938 See Fld. 11/8

AD-629 990 See Fld. 13/1

13/10. MARINE ENGINEERING

AD-629 860 Fld. 13/10, 14/1
CFSTI Prices: HC $1.60 MF $0.50
DEPARTMENT OF THE NAVY WASHINGTON D C
ANALYSIS OF THE OPERATING COSTS OF THE SCIENTIFIC RESEARCH WORK ON OCEANOGRAPHIC SURVEY SHIPS,
by P. S. Mitrofanov. 1966, 11p. Rept. no. Translation-949,
TT 66-60752
Unclassified report

Trans. of Morskoy Sbornik (USSR) v46 n1 Jan 1963.

Descriptors: (*Cost effectiveness, Oceanographic vessels), (*Oceanographic vessels, Cost effectiveness), Oceanology, Marine engineering, USSR

AD-629 872 Fld. 13/10
CFSTI Prices: HC $3.00 MF $0.75
DAVID TAYLOR MODEL BASIN WASHINGTON D C STRUCTURAL MECHANICS LAB
INSTRUMENTATION AND STATIC CALIBRATION OF THE FOIL SYSTEMS OF THE NAVY HYDROFOIL BOAT PLAINVIEW (AG (EH)-1).
Final rept.,
by Dennis J. Clark. Jan 66, 62p. Proj. DA-56200/SCN,
DTMB 2149
Unclassified report

Descriptors: (*Hydrofoil boats, Ship structural components), Hydrofoils, Design, Instrumentation, Calibration, Statics, Strain gages, Loading (Mechanics), Construction

The report describes the strain-gage installation of the foils and struts and the static calibration of the starboard and tail assemblies just prior to shipment to Seattle for final assembly on the hull. Results of the static calibrations are presented and compared to calculated strain values. The results are presented in the form of charts and tables so that they can be readily compared to full-scale data when these are available. Since the boat is still under construction, no conclusions can be drawn concerning the adequacy of the foil design, even though the calculated strains are higher than the strains measured during the static calibration for the same loading. (Author)

AD-629 876 Fld. 13/10, 13/4
CFSTI Prices: HC $1.10 MF $0.50
ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER WASHINGTON D C
FLEXIBLE FLOATING CONTAINERS FOR MARINE TRANSPORT,
by P. Kobzev. Nov 65, 7p. Rept. no. FSTC-381-T65-483-A, Proj. G7-1050, TT 66-60758
Unclassified report

Trans. of Morskoi Flot (USSR) n12 1964.

Descriptors: (*Containers, Flexible structures), (*Floating bodies, Containers), Cargo, Floats, USSR, Handling, Buoyancy

A description is given of Flexitainers having volumes from 30 to 500 cu. m. These are extensively used in England for transport and handling of mineral oils. Floating container 'Dracon' is made of synthetic rubbers of different types, depending upon the properties of cargoes contained, and is reinforced by heavy nylon fabric. Buoyancy gives additional support. Floating container ICB - Flexitainer is made in The Federated Republics of Germany from synthetic rubber with internal sheathing of various plastic materials; it is reinforced by fabrics and fibrous linings made of chemical fibers. There are also containers of a special structure which can be unloaded with the help of compressed air at a height greater than 10 m. They are used in places where there are no pumps or other devices for acceptance of cargoes, for supplying fuel to helicopters at sea, and in various emergencies. (Extracted)

AD-629 909 Fld. 13/10, 5/3
CFSTI Prices: HC $3.00 MF $0.75
DEPARTMENT OF DEFENSE WASHINGTON D C
MERCHANT MARINE TRAFFIC ORGANIZATION,
by S. M. Topchii, G. F. Shulyanskii, and A. F. Mironenko. 31 Jan 66, 84p. Rept. no. LN-285-65, TT 66-60759
Unclassified report

Organizatsiya Dvizheniya Morskogo Flota, trans. of mono. Morskoi Transport, Moscow, 1962 p7-16, 20-3, 24-42, 50-2, 52-63, 65, 131-3, 220-5 230-3.

Descriptors: (*Water traffic, USSR), (*Transportation, USSR), (*Merchant vessels, USSR), Economics, Cargo, Shipping (Marine), Marine engineering

Survey of the economical and technical aspects of the Soviet Union's merchant marine.

AD-630 005 Fld. 13/10
CFSTI Prices: HC $4.00 MF $1.00
CORNELL AERONAUTICAL LAB INC BUFFALO N Y
EFFECTS OF CONFIGURATIONAL CHANGES ON TANDEM PROPELLER PERFORMANCE. PHASE IV.
Final technical rept., Oct 64-Feb 66, by William G. Wilson. Feb 66, 150p. Rept. no. CAL-AG-1634-V-9, Contract Nonr-3659 (00),
Unclassified report

See also AD-607 493.

Descriptors: (*Propellers (Marine), Performance (Engineering)), Configuration, Captive tests, Maneuverability, Underwater vehicles, Equations, Hulls (Marine), Force (Mechanics), Moments

Theoretical equations which provide means for computing the propeller-generated forces and moments are derived. The results of captive tests of eight variations of a large scale semi-hull and propeller combination at zero forward speed both with and without a lateral velocity are discussed. Based on the high lateral force to power ratios measured in these tests, it is concluded that tandem propellers, in a wide range of configurational variations, can be efficiently employed for many low speed, highly maneuverable vehicles. (Author)

AD-630 068 Fld. 13/10, 20/4
CFSTI Prices: HC $4.00 MF $1.00
DAVID TAYLOR MODEL BASIN WASHINGTON D C
REPORT ABSTRACTS, GENERAL HYDROMECHANICS RESEARCH PROGRAM, CONTRACT PORTION.
Research and Development rept., Suppl 1, 1 Oct 64-30 Sep 65, by R. D. Cahn, A. B. Harwood, and H. R. Pollard. Feb 65, 117p. Rept. no. 1964,
Unclassified report

Suppl to DTMB-1964, AD-612 256.

Descriptors: (*Hydrodynamics, Scientific research), Reports, Abstracts, Fluid dynamic properties, Naval research, Aerodynamic characteristics, Cavitation, Boundary layer, Hydrofoils, Ships, Ocean waves

AD-630 165 Fld. 13/10, 14/2
CFSTI Prices: HC $1.10 MF $0.50
NAVAL OCEANOGRAPHIC OFFICE WASHINGTON D C
THE CREATION OF A CENTER OF OCEANOGRAPHIC INSTRUMENTS IN UNITED STATES (GOZDANIYE TSENTRA OKEANOGRAFICHESKIKH PRILEOROV V SSHA).
1965, 2p. Rept. no. Trans-245,
Unclassified report

Descriptors: (*Oceanographic equipment, Laboratories), (*Marine engineering, Oceanographic equipment), Oceanology, Instrumentation, Assembling, Test facilities

This center provides for the oceanographers of United States the needed means as well as experts for the construction, testing, comparison and calibration of oceanographic instruments. In order to achieve the goals, the center is equipped with special stands, barocameras, vibrators, thermostats, calibration instruments for reversing thermometers, 18-meter water turret for testing the instruments and a small vessel for field tests in local waters. The new instruments, which are constructed and tested by the center, include electronic bathythermographs, ship-borne wave graphs, the systems of buoys and instruments for measuring the sound speed in water. The Center will also give aid and advice to solving the problems of oceanographic equipment and instruments and will serve as an advisory panel for the collection and presentation of information on all types of oceanographic instruments. (Author)

AD-630 319 Fld. 13/10, 14/3
CFSTI Prices: HC $1.00 MF $0.50
DAVID TAYLOR MODEL BASIN WASHINGTON D C HYDROMECHANICS LAB
THE DTMB MARK 1 MOD 1 KNOTMETER.
Formal rept., by George B. Springston, Jr.. Mar 66, 11p. DTMB 1944-Suppl
Unclassified report

Descriptors: (*Meters, Velocity), Reliability, Transistors, Towed bodies, Ships, Measurement, Digital recording systems

The DTMB Mark 1 Mod 1 Knotmeter is a modification to the previously developed Mark 1 Knotmeter and consists of a substitution of transistorized instrumentation for vacuum-tube instrumentation. This change tends to improve the reliability of the system but does not alter its calibration. (Author)

AD-630 354 Fld. 13/10, 20/4
CFSTI Prices: HC $5.60 MF $0.50
SAINT ANTHONY FALLS HYDRAULIC LAB UNIV OF MINNESOTA MINNEAPOLIS
ON THE EXISTENCE OF ZERO FORM-DRAG AND HYDRODYNAMICALLY STABLE SUPERCAVITATING HYDROFOILS.
Final rept., by R. Oba. Nov 65, 53p. Rept. no. Technical paper-54-B, Contract Nonr-710 (24), Proj. NR-062-052,
Unclassified report

Descriptors: (*Hydrofoils, Design), Drag, Stability, Fluid dynamic properties, Cavitation, Configuration, Lift, Surfaces

The linearized complex acceleration potential is obtained for a hydrofoil of arbitrary shape in steady motion beneath a free surface with cavity of infinite length in simple and compact form. Under appropriate limiting conditions, it is shown that the solutions obtained from this potential reduce to the known solutions of Green for a planing foil, and of Auslaender and Hsu for a flat plate foil with or without flat flap near the free surface. Using some numerical results obtained from the complex potential, it is shown that there exists theoretically a supercavitating hydrofoil with finite lift coefficient and zero form drag. It is also shown that there exists theoretically a supercavitating hydrofoil with stable characteristics when shallowly submerged; that is, the lift coefficient increases as the submergence increases. Possible shapes for these hydrofoils are suggested so that the free streamlines from the leading edges do not intersect the foil surface (the hydrofoils are physically real) and so that the pressure on the pressure surface is everywhere greater than cavity pressure and less than stagnation pressure (except near the leading and trailing edges). (Author)

AD-630 417 Fld. 13/10
CFSTI Prices: HC $1.10 MF $0.50
DEPARTMENT OF THE NAVY WASHINGTON D C
IMPROVEMENT OF WATER DISTILLATION ON SUBMARINES,
by N. A. Astratov. 1966, 5p. Rept. no. Translation-992,
Unclassified report

Ob Uluchshenii Vodoopreseniya na Podvodnykh Lodkakh, trans. of Morskoi Sbornik (USSR) n2 p70-3 1963.

Descriptors: (*Submarines, Water supplies), (*Distillation, Submarines), Sea water, Vacuum apparatus, USSR

AD-630 419 Fld. 13/10, 21/5
DEPARTMENT OF THE NAVY WASHINGTON D C
EFFECTIVENESS OF GAS-TURBINE INSTALLATIONS WITH SEPARATE DELIVERY OF WORKING MEDIUM ABOARD SEA-GOING SHIPS,
by V. U. Tikhoplav. 1963, 9p. Rept. no. Translation-958,
Unclassified report

Translation of Sudostroyeniye (USSR) no. 3, 1963.

Descriptors: (*Gas turbines, Effectiveness), Design, Shipborne, Compressors, Diffusers, Exhaust gases, Ship hulls, Propellers (Marine), USSR, Hydrofoil boats, Marine propulsion

AD-630 430 Fld. 13/10, 20/4
CFSTI Prices: HC $3.00 MF $0.75
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF NAVAL ARCHITECTURE AND MARINE ENGINEERING
SHIP MODEL TESTS IN IRREGULAR SEAS AND CORRELATION WITH FULL SCALE TRIALS.
Final rept.,
by Willy J. Moreau. Dec 65, 66p. Rept. no. 65-12 ,DSR-4632
Contract Nonr-3963, Proj. NR-062-361,
Unclassified report

Descriptors: (*Ship models, Motion), (*Cargo ships, Motion), Model tests, Water waves, Pitch (Motion), Simulation, Tanks (Containers), Moments, Bending, Correlation techniques, Ocean waves

A comparison is made between four methods of determining the heave and pitch responses of a ship in waves. Full scale data were obtained from measurements in normal merchant service conditions on board the Belgian cargo liner M. V. JORDAENS. Model tests were carried out on a 1/100 scale model in regular and irregular waves in the same conditions as those encountered at sea. Theoretical computations were made using Linear Strip Theory with Grim's coefficients. Wave measurements at sea were obtained with a Tucker shipborne wave recorder. An attempt was made to reproduce the same irregular pattern in the model tank. A comparison of bending moments measured on the ship and computed by strip theory is also presented. (Author)

AD-630 433 Fld. 13/10
CFSTI Prices: HC $1.00 MF $0.50
NAVY MARINE ENGINEERING LAB ANNAPOLIS MD
THE CRITICAL DAMPING CALCULATOR AND THE EVALUATION OF MEASURING SYSTEMS TO DETERMINE DAMPING PROPERTIES OF STRUCTURES.
Research and development rept.,
by B. Douglas, and C. Longley. Mar 66, 21p.
Rept. no. MEL-98/66,
Proj. S-F013-11-08, Task 01358,
Unclassified report

Descriptors: (*Damping, Measurement), (*Structures, Vibration), Nomographs, Marine engineering

An analysis of existing experimental methods for measuring damping properties of structures revealed measurement limitations not previously reported. A new experimental approach, the critical damping calculator developed by MEL, is compared with previously used measurement systems and with theoretical results. Deficiencies in all the reported methods (free decay and the various impedance methods) are discussed, and a range of accuracy is determined and tabulated. The critical damping calculator was found to give relatively accurate results over a broad measurement range where a combination of the other measurement systems would be necessary to obtain the same accuracy. (Author)

AD-629 861 **See Fld. 13/8**

AD-629 931 **See Fld. 1/2**

AD-630 171 **See Fld. 10/2**

AD-630 285 **See Fld. 10/2**

AD-630 318 **See Fld. 11/4**

AD-630 325 **See Fld. 5/1**

AD-630 353 **See Fld. 20/4**

13/10.1 SUBMARINE ENGINEERING

AD-630 485 Fld. 13/10.1, 6/7
CFSTI Prices: HC $2.00 MF $0.50
HYDRONAUTICS INC LAUREL MD
MODEL INVESTIGATION OF THE HATCH LOADS ACTING ON A MOTHER SUBMARINE DUE TO THE ATTACHMENT OF A RESCUE SUBMARINE.
Technical rept.,
by Richard H. Love. Aug 65, 30p. Rept. no. TR-511-3,
Contract Nonr-4768 (00), Proj. NR-062-357,
Unclassified report

Descriptors: (*Hatches, Loading (Mechanics)), (*Submarines, Rescues), Moments, Model tests, Thrust vector control systems, Hovering, Submarine escape, Attachment, Sea rescue equipment

Model tests were made to determine the forces and moments at the aft hatch of a modern submarine due to the attachment of a rescue submarine. The model of the rescue submarine has vertical and horizontal thruster ducts fore and aft, and an all-movable ring tail. These devices are to be used to control the rescue submarine, both at hovering speeds and underway. It was found that the loads on the hatch of the prototype submarine are quite large. These loads can be reduced by proper coordination of the all-movable ring tail with the controls of the mother submarine. (Author)

13/11. PUMPS, FILTERS, PIPES, TUBING AND VALVES

AD-630 273 Fld. 13/11
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
GAS EJECTOR,
by Yu. K. Arkadov. 18 Feb 66, 5p. Rept. no. FTD-TT-65-1783,
Unclassified report

Unedited rough draft trans. of Patent (USSR) 171 498, appl. 893301/24-6, 30 Mar 65.

Descriptors: (*Jet pumps, Nozzles), (*Nozzles, Jet pumps), Supersonic flow, Supersonic nozzles, Patents, USSR

AD-630 421 Fld. 13/11
CFSTI Prices: HC $2.60 MF $0.50
NAVY MARINE ENGINEERING LAB ANNAPOLIS MD
INVESTIGATION OF FLEXIBLE PIPING CONNECTIONS,
Research and development rept.,
by A. L. Smookler. Feb 66, 29p. Rept. no. MEL-10/66
Proj. S-F113 11 09, Task 3955,
Unclassified report

Descriptors: (*Pipes, Flexible couplings), (*Flexible couplings, Pipes), Hydraulic couplings, Acoustic insulation, Expansion joints, Reliability, Pipe fittings, Performance (Engineering)

In evaluation tests conducted as part of the Navy's program for developing flexible pipe connections capable of accepting relative motions caused by vibration, shock, thermal movement and hull deflections, MEL has found two units worthy of further evaluation, one after redesign of sealing arrangement and another after being placed in a new configuration. A third and fourth failed in this phase of the evaluation program. (Author)

AD-629 885 **See Fld. 20/4**

AD-630 325 **See Fld. 5/1**

13/13. STRUCTURAL ENGINEERING

AD-629 928 Fld. 13/13
CFSTI Prices: HC $1.10 MF $0.50
RESEARCH TRIANGLE INST DURHAM N C
DETERMINATION OF SHELTER CONFIGURATION FOR VENTILATION.
Summary of final rept.,
by Edward L. Hill, J. George Caldwell, and William K. Grogan. 9 Jul 65, 9p. Rept. no. RTI-OU-177,
Contract OCD-PS-64-56,
Unclassified report

Descriptors: (*Fallout shelters, Configuration), (*Ventilation, Fallout shelters), Design, Buildings, Costs, Feasibility studies, Specifications

In Phase 1 of the National Fallout Shelter Survey (NFSS), all buildings in the United States, except single family dwellings, thought to have a protection factor (PF) of 20 or more and space to shelter 50 or more people were surveyed. Based on the results of the Phase 1 survey, contractors subsequently in Phase 2 of the NFSS evaluated designated facilities to determine the feasibility and cost of: (1) increasing shielding to provide a prescribed minimum protection factor; (2) improving habitability to meet minimum specifications; and (3) increasing shelter capacity. Shelters deemed acceptable also were marked with fallout shelter signs in Phase 2. Approximately 73 million shelter spaces had been marked by April, 1965.

AD-629 914 **See Fld. 5/1**

AD-629 915 **See Fld. 5/1**

AD-629 926 **See Fld. 5/1**

AD-629 927 **See Fld. 5/1**

AD-629 935 **See Fld. 5/1**

AD-629 939 **See Fld. 5/1**

AD-629 940 **See Fld. 5/1**

AD-629 941 **See Fld. 5/1**

AD-630 015 **See Fld. 5/1**

AD-630 016 **See Fld. 5/1**

AD-630 052 **See Fld. 5/1**

AD-630 325 **See Fld. 5/1**

Field 14-METHODS AND EQUIPMENT

14/1. COST EFFECTIVENESS

AD-630 207 Fld. 14/1, 15/5
CFSTI Prices: HC $2.00 MF $0.50
RCA SERVICE CO ALEXANDRIA VA
CRITERIA FOR VALUE ENGINEERING. PHASE I. FEASIBILITY STUDY.
Technical rept.,
by R. E. Purvis, and R. L. McLaughlin. Feb 66, 48p. Contract AF 30(602)-3850, Proj. AF-5519, Task 551901,
RADC TR-65-475
Unclassified report

Descriptors: (*Management engineering, Costs), (*Armed forces procurement, Cost effectiveness), (*Air Force procurement, Cost effectiveness), Feasibility studies, State-of-the-art reviews, Systems engineering, Logistics, Operations research, Design

The state of the art of value engineering is summarized a value analysis technique is proposed with the following characteristics: (a) Quantification of value consistent with established USAF specification of system utilization. (b) Value parameters which are predictable and measurable. (c) Systematic method of quantitative analysis which permit practical optimization in the least cost sense consistent with system value. (d) Technique structure which permits design tradeoff of discrete alternatives relating to cost and system value parameters. (e) Method of cost analysis which permits optimization with respect to total cost and is consistent with both design and operational value parameters. (f) Method of cost analysis based on difference principles which permits decisions through dominance of one alternative to another. (g) General method of analysis which permits cost in time and singling out areas significant cost differences between alternatives.

AD-629 860 See Fld. 13/10

AD-629 880 See Fld. 15/7

14/2. LABORATORIES, TEST FACILITIES, AND TEST EQUIPMENT

AD-629 779 Fld. 14/2, 20/4, 20/9
CFSTI Prices: HC $1.60 MF $0.50
VON KARMAN INST FOR FLUID DYNAMICS RHODE-SAINT-GENESE (BELGIUM)
LOW DENSITY HIGH TEMPERATURE GAS DYNAMICS.
Annual summary rept.,
by J. J. Smolderen. Jan 66, 14p. Contract AF-EOAR-13-65, Proj. AF-9783, Task 978301, AFOSR 66-0575

Unclassified report

Descriptors: (*Hypersonic flow, High-temperature research), (*Wind tunnels, Instrumentation), Test equipment, Jets, Density, Force (Mechanics), Wire, Transducers, Plasma medium, Arc heaters, Experimental design, Enthalpy, Belgium

A summary is given of low density hypersonic flow research. Progress is reported on wind tunnel instrumentation based upon a technique which takes advantage of a periodic modulation of the flow to improve the signalto-noise ratio of the instruments, which include hot wire probes and force measuring balances. (Author)

AD-629 917 Fld. 14/2
CFSTI Prices: HC $3.00 MF $0.50
DAVID TAYLOR MODEL BASIN WASHINGTON D C HYDROMECHANICS LAB
THE LOW TURBULENCE WIND TUNNEL.
Final rept.,
by Victor E. Scottron, and D. A. Shaffer. Dec 65, 52p. Rept. no. DTMB-2116, Proj. S-F013-11-08, Task 1356,

Unclassified report

Descriptors: (*Wind tunnels, Performance (Engineering)), Turbulence, Design, Friction, Velocity, Pressure, Dynamometers, Anemometers, Pitot tubes, Digital recording systems, Boundary layer

The low-turbulence wind tunnel was designed primarily for the investigation of frictional resistance phenomena but is not restricted to these applications. Velocity and pressure surveys were made of the tunnel as a function of fan speed. The turbulence level was measured and found to be above the 0.05 percent sought in the original design but far below the levels which appear in the boundary layers, jets, wakes, etc. The wind tunnel is adequate for experimental investigations, but the versatility and accuracy are somewhat limited due to the space in which the tunnel was constructed. (Author)

AD-629 958 Fld. 14/2, 7/4
CFSTI Prices: HC $1.10 MF $0.50
HARVARD COLL OBSERVATORY CAMBRIDGE MASS
SHOCK TUBE SPECTROSCOPY LABORATORY. ANNUAL REPORT,
by W. H. Parkinson, and E. M. Reeves. Mar 66, 9p. Contract Nonr-1866 (48),

Unclassified report

See also AD-612 923.

Descriptors: (*Shock tubes, Design), (*Atomic spectroscopy, Shock tubes), (*Molecular spectroscopy, Shock tubes), Instrumentation, Silanes, Chlorine compounds, Ionization, Absorption spectrum

Progress in basic research is under the sections 'Instrumentation', 'Theoretical Activities', 'Atomic Spectroscopy' and 'Molecular Spectroscopy'.

AD-629 999 Fld. 14/2, 20/12, 7/4
CFSTI Prices: HC $29.30 MF $1.50
PENNSYLVANIA STATE UNIV UNIVERSITY PARK COLL OF MINERAL INDUSTRIES
THE MEASUREMENT OF BORON AND OTHER IMPURITIES IN SEMICONDUCTOR MATERIALS BY MASS SPECTROMETRY.
Final rept. 16 Apr 59-30 Jun 62,
by L. F. Herzog, T. J. Eskew, and P. Deines. Jun 62, 297p. Contract AF 19 (604)-5538, Proj. AF-5620,
AFCRL 65-475

Unclassified report

Descriptors: (*Mass spectroscopy, Semiconductors), (*Semiconductors, Mass spectroscopy), Impurities, Boron, Chemical analysis, Spectrum analyzers, Design, Theory, Performance (Engineering), Wiring diagrams

A study was made of certain factors influencing the performance of mass spectrographs as tools for the chemical analysis of metals and semiconductors. Special emphasis was given to R-f spark, gas, and sputtering ion source design, problems of electron multiplier detection with the R-f source, direct electronic species-ratio determination techniques, vacuum problems, and the attainment of high abundance sensitivity. A 'breadboard' analytical mass spectrograph embodying recommendations resulting from this study was designed and constructed and the components built on the basis of the study were tested with this. This spectrograph employs a short-path-length ion-optic configuration with approximate second-order focusing proposed by Hintenberger and Konig. The spectrograph is designed so as to comprise the first section of a tandem ion-analysis system designed to be used for analyses requiring a higher abundance sensitivity than can be achieved with a single-stage spectrograph. The single-exposure mass range of the spectrograph is M to above 15M (for example m/e 1-15, 10-150, etc.).

AD-630 058 Fld. 14/2, 18/4, 13/8, 7/2
MICHIGAN UNIV ANN ARBOR DEPT OF CHEMISTRY
ELECTROCHEMICAL PREPARATION OF THIN METAL FILMS AS STANDARDS ON PYROLYTIC GRAPHITE,
by Basil H. Vassos, Francis J. Berlandi, Thomas E. Neal, and Harry B. Mark Jr.. 11 Jun 65, 4p. Contract DA-31-124-ARO (D)-284, AROD 5092:7-

Unclassified report

Availability: Published in Analytical Chemistry v37 n13 p1653-6 Dec 1965. Copies to DDC users only.

Descriptors: (*Metal films, Electrodeposition), (*Neutron flux, Monitors), (*Graphite, Metal films), Electrodeposition, Gold, Silver, Copper, Cobalt, Standards

Gold, silver, copper, and cobalt have been deposited quantitatively in microgram to milligram amounts on disks of pyrolytic graphite. Electrochemical plating conditions and the electrode pretreatment procedures that provided for the most uniform and strongly adhering metal film deposit are described. The procedures employed make use of both potentiometric and amperostatic electrochemical deposition techniques. The linearity of plating deposits, as a function of time, concentration, and current, is discussed together with other parameters affecting the deposition. With the use of operational amplifiers in the control circuits, the film deposits prepared showed an internal precision that was within plus or minus 2% when checked by a number of independent methods, including activation analysis. Potential application of such quantitatively prepared disks to neutron flux monitoring and to other analytical methods is discussed. (Author)

AD-630 065 Fld. 14/2, 20/6, 20/4
CFSTI Prices: HC $4.60 MF $0.50
BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD
DESIGN, OPERATION AND PRELIMINARY RESULTS OF THE BRL EXPANSION TUBE,
by Joseph H. Spurk. Oct 65, 44p. Rept. no. BRL-1304,
Proj. RDT/E-1P222901A201,

Unclassified report

Descriptors: (*Hypersonic flow, Test facilities), (*Interferometers, Hypersonic flow), Nonequilibrium flow, Shock tubes, Enthalpy, Instrumentation, Design, Operation, Cameras, Mirrors, Density, Turbulence

The paper describes the Ballistic Research Laboratories (BRL) expansion tube, which was built for interferometric observation of hypersonic flow fields. The optical instrumentation consists of a Mach-Zehnder interferometer in conjunction with a rotating mirror and frame camera. By means of simultaneous streak interferometry the free stream conditions are monitored and determined for each test run. With the free stream condition known, the frame interferogram of the flow around the model can be evaluated to give density or electron density field around the model. Examples of density distribution in the free stream are shown for two typical cases, with flow velocity of approx. 10,000 and 20,000 ft/sec, respectively. The density distribution within the shock layer of a reacting flow is shown and compared with theoretical prediction. Conical flow tests are performed in an attempt to assess the free stream turbulence. The effects of second diaphragm and the flow contamination are discussed. (Author)

AD-630 067 Fld. 14/2, 7/4
DUNHAM LAB YALE UNIV NEW HAVEN CONN
THE RESPONSE OF SCANNING FABRY-PEROT INTERFEROMETERS TO ATOMIC TRANSITION PROFILES,
by E. A. Ballik. 13 Jul 65, 3p. Contract DA-31-124-ARO (D)-124, AROD 4313:9

Unclassified report

Availability: Published in Applied Optics v5 n1 p170-2 Jan 1966. Copies to DDC users only.

Descriptors: (*Interferometers, Atomic energy levels), Theory, Mathematical analysis, Instrumentation

An exact expression is derived for the response of a tunable Fabry-Perot interferometer to a doplerbroadened Lorentzian profile. The derivation

is then used to develop a graphic technique for the investigation of atomic line-widths. This method should have wide application in the determination of both parameters which specify a given line shape, particularly in the case where the Fabry-Perot resonance separation is not much greater than the half-width of the atomic transition and/or the interferometer reflectance is low.

AD-630 115 Fld. 14/2
CFSTI Prices: HC $1.00 MF $0.50
DAVID TAYLOR MODEL BASIN PORTSMOUTH VA UNDERWATER EXPLOSIONS RESEARCH DIV
A METHOD TO CORRECT RECORDS FROM DISTRIBUTED PARAMETER VELOCITY TRANSDUCERS FOR HIGH FREQUENCY RESONANCE DISTORTIONS.
Research and development rept.,
by C. E. Stewart. Jan 66, 20p. Task NWET/TID-B5.01,
DTMB 1984
Unclassified report

Descriptors: (*Velocity, Meters), (*Meters, Velocity), Transducers, Corrections, Measurement, Data processing systems

A correction method devised to compensate for the high frequency distortions introduced by the mechanical characteristics of the commonly used two-coil bar-magnet velocity meter is considered. The application of the correction to both digital and analog data reduction procedures is discussed and illustrated. The correction can be applied more simply with automatic sampled data systems for the applications illustrated. The illustrations also show that a good correction is obtained to at least the first longitudinal mode frequency of the coil form. The delay method of signal correction has the advantage over conventional filtering techniques in that it introduces no phase distortion and is capable of compensating for very high magnification factors. (Author)

AD-630 162 Fld. 14/2, 20/12, 20/13
SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY RAPID CITY
DESIGN AND CONSTRUCTION OF A SYSTEM FOR THERMAL CONDUCTIVITY MEASUREMENTS IN THE TEMPERATURE RANGE 4 TO 300K.
Technical rept.,
by Ronald J. Holyer, and Robert G. Morris. 1965, 9p. Rept. no. TR-18,
Contract Nonr-2964 (01),
Unclassified report

Availability: Published in Proceedings of the South Dakota Academy of Science v44 p142-9 1965. Copies to DDC users only.

Descriptors: (*Semiconductors, Thermal conductivity), (*Thermal conductivity, Measurement), Test methods, Test equipment, Design, Low-temperature research, Cryogenics

A system was designed and constructed to measure the thermal conductivity of semiconductors in the temperature range 4 to 300K using the series comparative method. It is believed that the use of the series comparative method in the temperature range 4 to 300K is original with this work.

AD-630 163 Fld. 14/2
MISSOURI UNIV COLUMBIA DEPT OF PHYSICS
VACUUM ULTRAVIOLET REFLECTOMETER.
Technical rept.,
by Charles R. Chubb, and Eugene B. Hensley. 6 Nov 64, 5p. Rept. no. TR-30,
Contract Nonr-2296 (01), Proj. NR-372-081,
Unclassified report

Availability: Published in The Review of Scientific Instruments v36 n4 p547-8 Apr 1965. Copies to DDC users only.

Descriptors: (*Reflectometers, Films), Photomultipliers, Reflectivity, Adsorption spectrum, Measurement, Vacuum, Ultraviolet radiation

A new design for a vacuum ultraviolet reflectometer is described. Special features of this reflectometer include provisions for the preparation of thin film samples by chemical reaction after evaporation of separate components and the subsequent measurement of their optical absorption and reflectivity without exposing the films to the atmosphere. The detector, which consists of a sodium-salicylate-coated 1P28 photomultiplier, can be positioned in the direct beam for incident and transmitted intensity measurements and then rotated to other positions for reflected intensity measurements. (Author)

AD-630 205 Fld. 14/2, 13/2, 21/8.2
CFSTI Prices: HC $15.50 MF $1.00
GCA TECHNOLOGY DIV GCA CORP BEDFORD MASS
ATMOSPHERIC TRANSPORT OF ROCKET MOTOR COMBUSTION BY-PRODUCTS. VOLUME I. DATA ANALYSIS AND PREDICTION TECHNIQUE.
Final rept.,
by H. E. Cramer, H. L. Hamilton,Jr., and G. M. DeSanto. Dec 65, 159p. Contract N123 (61756)34567 (PMR),
Unclassified report

Descriptors: (*Test facilities, Rocket motors (Solid propellant)), (*Air pollution, Test facilities), Site selection, Toxicity, Tracer studies, California, Beryllium compounds, Oxides, Zinc compounds, Diffusion, Cadmium compounds, Sulfides, Micrometeorology, Captive tests

The development of a diffusion model and techniques for predicting atmospheric contaminant concentations and dosages at long distances downwind from a short-duration source on San Nicolas Island, California are described. This development was required to assist in the determination of the suitability of San Nicolas Island as a site for static testing of toxic fuel. The model is based on measurements made during a field program using a nontoxic tracer (zinc cadmium sulfide), on the results of earlier field programs, and on theoretical work. The subsidence inversion layer of the sub-tropical high pressure cell normally overlying this area and the disturbed wind flow regime in the lee of the island introduced unique features to this diffusion problem. Volume I contains the theoretical background, data analysis, and a description of the development of an operational model for diffusion prediction. The problem of cloud depletion through gravitational settling and other phenomena are discussed. (Author)

AD-630 206 Fld. 14/2, 13/2, 21/8.2
CFSTI Prices: HC $5.00 MF $1.25
GCA TECHNOLOGY DIV GCA CORP BEDFORD MASS
ATMOSPHERIC TRANSPORT OF ROCKET MOTOR COMBUSTION BY-PRODUCTS. VOLUME III. DATA SUPPLEMENT.
Final rept.,
by H. L. Hamilton,Jr.. Dec 65, 185p. Contract N123 (61756)34567 (PMR),
Unclassified report

See also AD-630 205.

Descriptors: (*Test facilities, Rocket motors (Solid propellant)), (*Air pollution, Test facilities), Site selection, Diffusion, Captive tests, Tracer studies, California, Beryllium compounds, Oxides, Zinc compounds, Cadmium compounds, Sulfides, Micrometeorology

Volume III contains a comprehensive compilation of the meteorological and diffusion measurements obtained during the field studies. (Author)

AD-630 261 Fld. 14/2, 13/2, 21/8.2
CFSTI Prices: HC $4.60 MF $0.50
GCA TECHNOLOGY DIV GCA CORP BEDFORD MASS
ATMOSPHERIC TRANSPORT OF ROCKET MOTOR COMBUSTION BY-PRODUCTS. VOLUME II. EXPERIMENTAL DESIGN AND FIELD INSTALLATION.
Final rept.,
by H. E. Cramer, H. Hamilton, and G. DeSanto. Dec 65, 47p. Contract N123 (61756)34567 (PMR),
Unclassified report

See also AD-630 205, AD-630 206.

Descriptors: (*Test facilities, Rocket motors (Solid propellant)), (*Air pollution, Captive tests), Site selection, Diffusion, Toxicity, Tracer studies, California, Micrometeorology, Particle size, Beryllium compounds, Radioactive fallout, Contamination, Experimental design, Radar equipment, Balloons

Volume II describes the design and equipment installation for the field program. In preparation for static firing tests, an elaborate installation was completed on San Nicolas Island to provide measurements of particle size, fallout, surface contamination, dimensions and concentration of the rocket motor exhaust clouds. For the tracer studies of long-range diffusion, an airplane equipped with a drum-impactor sampler and recorfing temperature and flight instruments was used for measurements. Land-based radar was used for position determination. To assist in locating the tracer plume, constant level balloons (tetroons) were released with the tracer plume and tracked by radar. (Author)

AD-630 265 Fld. 14/2
CFSTI Prices: HC $1.00 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
TEMPERATURE SENSING SYSTEM FOR MANOMETRIC THERMOMETERS,
by Z. G. Blyumshtein, V. S. Cherepanov, E. Z.Miftakhov, A. G. Spasskii, and B. A. Fomin.
17 Feb 66, 4p. Rept. no. FTD-TT-65-1934,
Unclassified report

Unedited rough draft trans. of Patent (USSR) 166 520, appl. 875764/26-10, 13 Jan 64.

Descriptors: (*Thermometers, High-temperature research), Ceramic materials, Gallium alloys, Indium alloys, Tin alloys, Patents, USSR

A temperature sensing system for manometric thermometers containing a thermal bulb and a capillary is described. To extend the upper limit of temperature measurement to 1200C an alloy containing 66.8 to 67.2% gallium, 10.3 to 10.7% indium, and 12 to 13% tin is used as a filler. The thermal bulb is made of a material that is stable to the filler at high temperatures, for example, alundum or some other ceramic or ceramet material.

AD-630 315 Fld. 14/2, 20/4
CFSTI Prices: HC $2.00 MF $0.50
ARNOLD ENGINEERING DEVELOPMENT CENTER ARNOLD AIR FORCE STATION TENN
INVESTIGATION OF MICROWAVE AND SONIC METHODS FOR MEASURING LIQUID LEVEL AND FLOW RATE.
Technical rept.,
by K. R. Carr, and J. U. Clark. Mar 66, 32p.
Rept. no. AEDC-TR-66-1,
Contract AF 40 (600)-1200,
Unclassified report

Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Liquid level gages, Experimental design), (*Flowmeters, Experimental design), (*Microwave equipment, Liquid level

gages), (*Ultrasonic radiation, Liquid level gages), Electromagnetic wave reflections, Sound, Echo ranging, Fluid mechanics, Instrumentation

Microwave and ultrasonic reflections from a liquid surface have been studied to determine the feasibility of their use in measuring liquid flow. Reflected ultrasonic pulses appear useful for measuring the change between static levels of large dimensions. However, for measuring small continuous changes the accuracy is not satisfactory. Microwave reflections provide an output that can be used for the measurement of total change in level or flow data. (Author)

AD-630 366 Fld. 14/2, 22/3, 20/6
LINCOLN LAB MASS INST OF TECH LEXINGTON
A SPECTRAL RADIOMETER FOR REENTRY MEASUREMENTS,
by Robert V. Meyer. 2 Apr 65, 8p. Rept. no. JA-2565,
Contract AF 19 (628)-5167 ,ARPA Order-512
ESD TDR-66-27
Unclassified report

Availability: Published in Applied Optics v5 n1 p159-65 Jan 1966. Copies to DDC users only.

Descriptors: (*Radiometers, Reentry vehicles), (*Reentry vehicles, Radiometers), Atmosphere entry, Measurement, Luminescence, Optics, Radiation measurement systems, Infrared radiation, Spectra (Infrared)

A radiometer (METER (Multi-Element (detector) Total Event Radiometer)) specifically designed to measure the radiant power emitted by a reentry event is discussed. The measurement problem is presented. The optical design problem is evaluated. The result of a computer-designed optical configuration is given. The electronic circuits and data recording system are discussed, and the performance of the system is evaluated in terms of the measurement problem.

AD-630 408 Fld. 14/2, 13/8, 20/6
CFSTI Prices: HC $3.00 MF $0.75
PENNSYLVANIA STATE UNIV UNIVERSITY PARK ORDNANCE RESEARCH LAB
ANALYSIS AND DESIGN OF A MACHINE-SCAN ELECTRON BEAM DEVICE.
Technical memo.,
by R. B. Fair. 8 Mar 66, 85p. Rept. no. TM-630-3281-03,
Contract NOw-65-0123-d.
Unclassified report

Descriptors: (*Electron beams, Scanning), (*Electron microscopes, Scanning), Electron guns, Electron optics, Deflection, Machining, Analysis, Design, Miniature electronic equipment

Electron beams can be used to perform a dual role in the fabrication of microcircuits. An electron source may be pulsed to provide a beam capable of machining materials, or alternately, to provide a low current beam for scanning electron image formation. If the beam is pulsed to high and low intensities at a sufficiently fast rate, it is possible to obtain a continuous picture of a bombarded specimen being machined. This paper presents the results of a study concerned with the design of a machine-scan electron beam device to perform the above operation. Theoretical calculations are coupled with experimental observations in order to design a suitable device, and a performance analysis on this apparatus is presented. The recommendations deal specifically with improvements on the device for further research. (Author)

AD-630 410 Fld. 14/2, 8/5
CFSTI Prices: HC $7.60 MF $0.75
PICATINNY ARSENAL DOVER N J AMMUNITION GROUP
GRAVITY GRADIENT MEASUREMENTS.
Technical memo.,
by Wilhelm J. Lohninger. Jul 62, 73p.
PA TM-147-62
Unclassified report

Descriptors: (*Accelerometers, Experimental design), (*Gravity, Measurement), (*Geodesics, Gravity), Instrumentation

The behavior of specific force receivers, defined as active or dynamic sensors, when affected by gravitational, linear and centrifugal accelerations is theoretically investigated. The capability of these active sensors: (A) To sense gravitational, linear and centrifugal accelerations; (B) to measure the gradient of a gravitational field; (C) to determine the direction of the gravity gradient or the local vertical; (D) to sense the state of a body falling freely, for example, along a gradient line is examined, taking as an example a miniaturized, commercially available sensor. This investigation is primarily concerned with the physics of the suggested types of active sensors and of one or more dimensional assemblies of such sensors, their development, improvement of their sensitivity and their testing by methodic experiments and accurate measurements. It is hoped that such experimental investigations will contribute useful information concerning the problem of gravity gradient sensing and measurement. (Author)

AD-630 438 Fld. 14/2, 20/8
CFSTI Prices: HC $1.00 MF $0.50
GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND DEVELOPMENT CENTER
TIME-OF-FLIGHT SPECTROMETER.
Quarterly rept. no. 13,
by G. C. Baldwin. Feb 66, 10p. Contract Nonr-3942 (00),
Unclassified report

See also AD-624 825.

Descriptors: (*Spectrum analyzers, Data), (*Helium, Nuclear cross sections), (*Argon, Nuclear cross sections), Electrons, Probability, Helium group gases

Activity consisted largely of transmission experiments with the noble gases, principally He and Ar. Preliminary total cross sections in the range 0.2 - 1.0 v deduced from these data agree closely with other measurements. These experiments have brought to light several new problems. Their origin and probable solutions are discussed.

AD-630 468 Fld. 14/2, 20/4
CFSTI Prices: HC $3.00 MF $0.50
DAVID TAYLOR MODEL BASIN WASHINGTON D C HYDROMECHANICS LAB
THE HYDROGEN-BUBBLE, FLOW-VISUALIZATION TECHNIQUE.
Final rept.,
by George E. Mattingly. Feb 66, 51p. Rept. no. 2146,
Proj. S-R009-0101, Task 0103,
Unclassified report

Descriptors: (*Flow visualization, Bubbles), (*Hydrogen, Bubbles), Fluid flow, Water tunnels, Photographic techniques, Photographic analysis, Velocity, Errors, Wire, Stagnation point, Flow separation

The hydrogen-bubble visualization technique was adapted to a 12-inch variable-pressure water tunnel. An outline of this adaption and the operation of the technique are described. Photographic techniques and analyses applied to the resulting films are discussed. Sources of error are delineated, particularly with regard to the deceptive streakline patterns that can be formed and especially the results of exceeding the velocity limitation imposed by the shedding phenomena taking place behind the platinum wires. Errors caused by compression and/or stretching of bubble lines along their length are discussed, and procedures are given for recognizing this type of error. In additon, cathode -wire configurations are described by which both longitudinal and transverse velocity profiles can be obtained in steady or unsteady water flows. Various cathode-wire configurations are described through which qualitative aspects of the flow about bodies as stagnation and separation point motions are depicted. (Author)

AD-630 492 Fld. 14/2, 9/1
DEFENCE RESEARCH MEDICAL LABS TORONTO (ONTARIO)
TRANSISTOR RC OSCILLATOR WITH SINGLE-ELEMENT TUNING.
Revised ed.,
by Lloyd E. MacHattie. 3 Jun 65, 6p. Rept. no. DRML-RP-542,
Unclassified report

Revision of manuscript submitted 12 May 64.

Availability: Published in IEEE Transactions on Instrumentation and Measurement v1M14 n4 p204-8 Dec 1965. Copies to DDC users only.

Descriptors: (*Oscillators, Transistors), (*Tuning devices, Oscillators), (*Transistors, Oscillators), Phase shifters, Telemeter systems, Temperature sensitive elements, Circuits, Design, Wiring diagrams, Theory, Thermistors

RC oscillators based on two active phase shifters of the all-pass type prove to be tunable over a 10-to-1 frequency range by varying a single resistance. Harmonic distortion can be less than 1 percent over this range. Analysis is made of the variation of Q with tuning and the dependence of phase shift on detailed circuit parameters. Oscillators of this type can be used in telemetry to generate a subcarrier frequency which is a measure of transducer resistance. With temperature compensation, oscillator frequency stability is sufficient to permit the measurement of temperature to plus or minus 0.1C over the range -5C to 40C using a thermistor sensor. (Author)

AD-629 767 See Fld. 19/1
AD-629 982 See Fld. 8/5
AD-629 986 See Fld. 4/1
AD-629 990 See Fld. 13/1
AD-630 073 See Fld. 4/2
AD-630 091 See Fld. 9/5
AD-630 092 See Fld. 9/1
AD-630 124 See Fld. 20/14
AD-630 165 See Fld. 13/10
AD-630 229 See Fld. 18/4
AD-630 230 See Fld. 18/4
AD-630 293 See Fld. 4/1
AD-630 339 See Fld. 7/4
AD-630 450 See Fld. 20/4
AD-630 460 See Fld. 4/2
AD-630 463 See Fld. 22/2
AD-630 470 See Fld. 20/6
AD-630 490 See Fld. 13/8

14/3. RECORDING DEVICES

AD-630 319 See Fld. 13/10

14/5. REPROGRAPHY

AD-629 843 See Fld. 11/6
AD-630 405 See Fld. 8/2

Field 15-MILITARY SCIENCES

15/1. ANTISUBMARINE WARFARE

AD-630 122 See Fld. 8/12

15/2. CHEMICAL, BIOLOGICAL, AND RADIOLOGICAL WARFARE

AD-629 784 Fld. 15/2, 15/3
CFSTI Prices: HC $9.60 MF $0.75
STANFORD RESEARCH INST MENLO PARK CALIF
RADIOLOGICAL TARGET ANALYSIS PROCEDURES,
by Hong Lee. Mar 66, 100p. Contract N228-(62479)65421, Proj. MU-5069,
Unclassified report

Descriptors: (*Radiological warfare, Civil defense systems), (*Civil defense systems, Radiological warfare), Radioactive fallout, Fallout shelters, Health physics, Decontamination

The radiological target analyses in this report consist of a series of analytical procedures for evaluating the residual numbers for shelters and other locations before, during, and after decontamination so that exposure doese may be calculated. These residual numbers are used to provide estimates of (1) shelter stay times, (2) manpower requirements for proposed decontamination, (3) exposure to recovery personnel, (4) decontamination effectiveness requirements, (5) equipment and supplies requirements, and (6) feasibility of plans and schedules for the recovery of vital facilities and living areas. Tables, charts, figures, and sample calculations provide working tools which may be used for civil defense planning and training, and similar practical levels of radiological defense preparation. (Author)

AD-630 281 See Fld. 15/3

15/3. DEFENSE

AD-630 254 Fld. 15/3, 17/2
CFSTI Prices: HC $3.60 MF $0.50
RADIO CORP OF AMERICA NEW YORK COMMUNICATIONS SYSTEMS DIV
CIVIL DEFENSE COMMUNICATIONS RESEARCH, TASK 1.
Final rept.,
by K. Curtin, and L. Siegel. Oct 65, 38p. Rept. no. CR-65-419-21-Vol-1,
Unclassified report

Descriptors: (*Civil defense systems, Communication systems), Traffic, Networks, Reliability, Redundant components, Performance (Engineering), Compatibility, Optimization, Probability, Graphics, Linear systems, Cost effectiveness, Mathematical models

The survivability problem of communications systems - from the viewpoint of analysis - is defined as the problem of relating varying levels of destruction to surviving traffic-handling capability. Using linear graph concepts, three network survivability design parameters are specified and then related to varying levels of destruction. A procedure is then provided for translating surviving 'connectivity' into a traffic-handling measure - the Priority Completion Index. (Author)

AD-630 281 Fld. 15/3, 15/2, 15/6, 6/18
CFSTI Prices: HC $3.60 MF $0.50
DEPARTMENT OF THE NAVY WASHINGTON D C
RULES FOR THE BEHAVIOR OF THE POPULATION IN CONTAMINATED AREAS,
by V. A. Medvedev. 1966, 37p. Rept. no. Translation-753,
TT 66-60813
Unclassified report

Trans. of unidentified mono., pub. by DOSAAF Publishing House, Moscow, 1958.

Descriptors: (*Civil defense systems, Instruction manuals), (*Contamination, Civil defense systems), (*Radiological warfare, Civil defense systems), (*Chemical warfare, Civil defense systems), (*Biological warfare, Civil defense systems), Behavior, Aerial warfare, Radiological contamination, Biological contamination, Chemical contamination, Population, USSR, Chemical warfare agents, Biological warfare agents

Contents: General information; Special rules for the behavior of the population in an area contaminated with radioactive matter; Special rules for the behavior of the population in an area contamined with war gases; Specific properties of a bacteriological contamination.

AD-629 784 See Fld. 15/2

15/5. LOGISTICS

AD-629 906 Fld. 15/5
CFSTI Prices: HC $1.60 MF $0.50
RAND CORP SANTA MONICA CALIF
RAND'S ROLE IN LOGISTICS SYSTEMS,
by Murray A. Geisler. Mar 66, 13p. Rept. no. P-3329,
Unclassified report

Prepared for presentation to the Kelly Management Club, Kelly AFB, Tex., 3 Mar 66.

Descriptors: (*Logistics, Systems engineering), (*Systems engineering, Logistics), Armed forces research, Maintenance, Management engineering, Air Force

Examples are given of logistic research effort in three broad categories: (1) Support of new systems and operational concepts. (2) New logistics hardware. (3) Support concepts and policies.

AD-630 118 Fld. 15/5, 5/1
CFSTI Prices: HC $2.00 MF $0.50
ARMY NATICK LABS MASS
BIBLIOGRAPHY OF PUBLICATIONS AND TECHNICAL PAPERS FOR 1963.
Technical rept.
May 64, 32p. Rept. no. NL-1,
Unclassified report

Descriptors: (*Army research, Bibliographies), Army equipment, Clothing, Geophysics, Food, Mechanical engineering, Management planning, Organic materials, Containers

The research is divided according to the following originating groups: Office of the Commanding General, Office of Scientific Director, Plans Office, Air Delivery Equipment Division, Clothing and Organic Materials Division, Container Division, Earth Sciences Division, Food Division, Mechanical Engineering Division, Pioneering Research Division.

AD-630 132 Fld. 15/5, 5/1
CFSTI Prices: HC $2.00 MF $0.50
ARMY NATICK LABS MASS
BIBLIOGRAPHY OF PUBLICATIONS AND TECHNICAL PAPERS FOR 1964.
Technical rept.
May 65, 47p. Rept. no. NL-2,
Unclassified report

Descriptors: (*Army research, Bibliographies), Air drop operations, Management planning, Clothing, Organic materials, Containers, Geophysics, Food, Mechanical engineering

The research is divided according to the following originating groups: Office of the Commanding General, Office of Scientific Director, Plans Office, Airdrop Engineering Division, Clothing and Organic Materials Division, Container Division, Earth Sciences Division, Food Division, Mechanical Engineering Division, Pioneering Research Division.

AD-629 769 See Fld. 1/2

AD-630 131 See Fld. 13/8

AD-630 207 See Fld. 14/1

15/6. NUCLEAR WARFARE

AD-630 292 Fld. 15/6, 6/5
CFSTI Prices: HC $2.60 MF $0.50
NAVAL APPLIED SCIENCE LAB BROOKLYN N Y
THE MEDICAL BURDEN FROM SKIN BURNS AT NAGASAKI: A REAPPRAISAL.
Progress rept. no. 11,
by George Mixter,Jr.. 12 Oct 65, 25p. Proj. 9400, Task 940012,
DASA 1721
Unclassified report

Descriptors: (*Nuclear warfare casualties, Japan), (*Burns, Nuclear warfare casualties), Nuclear explosions, Thermal radiation, Skin, Survival, Mortality rates, Graphics, Statistical analysis

The medical burden at Nagasaki i.e. the number of persons who required medical care as a result of receiving skin burns caused by thermal radiation, was determined as a function of the distance from ground zero and radiant exposure. The casualties were computed on the basis of available burn casualty and survival data and a re-estimate of burst conditions. Of an initial population of approximately 174,400 persons, 8355 or 4.5% of the total population survived 20 days after the detonation after receiving serious burns. Of the 20-day survivors, 1800 had been closer than 1000 meters to ground zero, 13.5% of whom had skin burns. A total of 5800 20-day survivors had been at distances of from 1500 to 2000 meters 18.1% of whom had skin burns. Of the 54,600 survivors who had been at distances of from 4000 to 5000 meters, only 2.9% had skin burns. The data are presented in a form to allow estimates of casualties for situations resembling those at Nagasaki. From an analysis of the casualty data and from estimates made by Japanese doctors of the number of persons who survived immediately after the detonation, a casualty rate curve has been derived for the 20-day interval following the detonation. (Author)

AD-630 281 See Fld. 15/3

15/7. OPERATIONS, STRATEGY, AND TACTICS

AD-629 879 Fld. 15/7, 12/2
CFSTI Prices: HC $1.60 MF $0.50
RAND CORP SANTA MONICA CALIF
TARLOG: A DIFFERENTIAL GROUND COMBAT MODEL,
by Eugene P. Durbin. Feb 66, 18p. Rept. no. P-3301,
Unclassified report

Descriptors: (*Warfare, Game theory), (*Game theory, Warfare), (*Casualties, Det-

ermination), Analog computers, Digital computers, Attrition, Weapons, Mathematical models, Ammunition, Artillery, Effectiveness, Differential equations, Tactical warfare, Aerial warfare

Tarlog operates on combat units, altering their composition and location as battle proceeds. Units are initially described by name, number of personnel, and number of each of sixty weapon types. Units are assigned one of five missions which determine their behavior. These are attack, prepared defense, hasty defense, counter-attack, and delay to an objective. Four proportionality constants are required as input data. These control the rate of attrition caused by incoming fire, suppression of firepower output due to incoming fire, reduction in unit firepower output due to unit movement, and reduction in unit speed (or ability to hold) due to incoming fire. The model uses five matrices of numbers which describe the relative effectiveness of each ground weapon class against each other ground weapon class for each of the five missions of the firing unit, and two matrices of numbers which perform the same function for air weapons. The Tarlog model determines the number of personnel casualties from the number of weapons lost. (Author)

AD-629 880 Fld. 15/7, 5/3, 14/1
CFSTI Prices: HC $3.60 MF $0.50
RAND CORP SANTA MONICA CALIF
INCREASING RETURNS IN MILITARY PRODUCTION FUNCTIONS,
by Malcolm W. Hoag. Feb 66, 32p. Rept. no. P-3309,
Unclassified report

Prepared for presentation at the Universities-National Bureau of Economic Research Conference on the Economics of Defense, to be held at the University of Chicago on April 15-16 1966.

Descriptors: (*National defense, Economics), (*Warfare, Economics), (*Economics, National defense), History, Antimissile defense systems, Guided missiles (Surface -to-surface), Game theory, Casualties, Cost effectiveness, Military requirements, South Korea, China, Western Europe, Military strategy

The central issue for the paper can be put in terms of this contrast: Where and why does analytic marginalism apply well to military problems, and where not and why. Consequently when must economic analysis establish a relevant resource level before applying marginal cost/effectiveness tests. Given this central focus, the related problem is almost automatically treated: How improve mutual understanding and communication between military professionals and the civilian analysts of military problems who, although they are for the most part not economists by training, are applying economic principles in their quantitative tests. Both of these questions arise, above all, in determining what aggregate military 'requirements' are to be, as distinct from determining which among competing alternative weapon systems or forces is to fulfill a given requirement. They arise when the scale of military operations for a particular theater or function is itself brought into question, and therefore the total budget for it. (Author)

AD-630 312 **See Fld. 5/9**

Field 16-MISSILE TECHNOLOGY

16/4.1 AIR- AND SPACE-LAUNCHED MISSILES

AD-630 418 Fld. 16/4.1, 1/3
CFSTI Prices: HC $1.10 MF $0.50
DEPARTMENT OF THE NAVY WASHINGTON D C
THE MISSILE CARRIERS ARE LEAVING FOR THE OCEAN,
by N. Kotish. 1966, 6p. Rept. no. Translation-946,
Unclassified report

Trans. from Krasnaya Zvezda (USSR) n277 25 Nov 1962.

Descriptors: (*Guided missiles (Air-to-surface), USSR), Oceans, Airplanes, Reconnaissance planes

Fictionalized account of search for an enemy ship and the attack.

Field 17-NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

17/1. ACOUSTIC DETECTION

AD-630 422 Fld. 17/1, 20/1
CFSTI Prices: HC $3.00 MF $0.75
RAND CORP SANTA MONICA CALIF
BEARING ANGLE ESTIMATION OF ATMOSPHERIC SONIC PLANE WAVES USING GROUND ARRAYS,
by M. Blum. Feb 66, 62p. Rept. no. RM-4898-ARPA,
Contract SD-79 ,ARPA Order-189-61
Unclassified report

Descriptors: (*Direction finding, Acoustic equipment), (*Acoustic equipment, Direction finding), (*Acoustics, Atmosphere), (*Sound, Direction finding), Microphones, Data processing systems, Nuclear explosions, Detection

A presentation of data processing techniques developed to obtain bearing angle estimates of plane sonic waves using arbitrary ground arrays of microphones. The evaluation of the accuracy obtainable as measured by the rms bearing angle error is computed in detail for a proposed 16-station square array for use in the VELA detection system. A novel feature of the method is that the ground trace velocity of sound need not be already known or measured independently, but can be derived from the same measurements as the bearing angle. (Author)

AD-630 351 **See Fld. 20/1**

AD-630 352 **See Fld. 20/1**

17/2. COMMUNICATIONS

AD-630 243 Fld. 17/2, 20/5, 20/6
CFSTI Prices: HC $3.00 MF $0.75
LINCOLN LAB MASS INST OF TECH LEXINGTON
OPTICAL COMMUNICATIONS EMPLOYING SEMICONDUCTOR LASERS.
Technical rept.,
by E. J. Chatterton. 9 Jun 65, 73p. Rept. no. TR-392,
Contract AF 19 (628)-500,
ESD TDR-65-232
Unclassified report

Descriptors: (*Lasers, Light communication systems), (*Light communication systems, Lasers), (*Semiconductors, Lasers), Light transmission, Atmosphere, Frequency modulation, Amplitude modulation, Pulse modulation, Fiber optics, Optical equipment, Narrowband, Circuits, Electronic equipment, Communication systems

This report discusses the development of optical communications employing semiconductor lasers-both noncoherent and coherent. The large modulation bandwidth obtainable with these devices permits the development of frequency- and pulse-modulation communications systems which overcome scintillation noise produced by the turbulent atmosphere. Emphasis has been placed on the development of communications systems for 98-percent weather capability over short ranges, rather than fairweather capability over long ranges. The development of supporting technology is presented in the areas of semiconductor lasers, fiber optics, optical systems, narrowband optical filters, photomultipliers, and frequency- and pulse-modulation electronic circuitry and components. Measurements of optical signals over a two-mile path under a full variety of weather conditions have permitted a comparative evaluation of AM, FM, and PM systems. The results show clearly the advantage of frequency modulation and pulse modulation. Measurements of pulses transmitted appreciably beyond the limits of visibility in snow and fog indicate a channel bandwidth, limited by scatter-multipaths, but of the order of 200 Mcps. An analysis is presented of multiple-scatter paths and system design considerations for these conditions. (Author)

AD-630 271 Fld. 17/2, 9/4
CFSTI Prices: HC $9.60 MF $0.75
RAND CORP SANTA MONICA CALIF
ADAPTIVE ROUTING TECHNIQUES FOR DISTRIBUTED COMMUNICATIONS SYSTEMS,
by B. W. Boehm, and R. L. Mobley. Feb 66, 95p. Rept. no. RM-4781-PR,
Contract AF 49 (638)-1700,
Unclassified report

Descriptors: (*Communication systems, Queueing theory), (*Queueing theory, Communication systems), (*Information theory, Queueing theory), Networks, Scheduling, Adaptive systems, Stochastic processes, Dynamic programming, Command + control systems, Military requirements

A discussion of the operational characteristics of the various adaptive routing techniques. The Memorandum shows that the techniques previously investigated are insufficient for the task, and investigates a number of promising alternatives. Among these are some stochastic techniques that use information on messages passing through the network to adjust the tables, and some deterministic techniques that use dynamic programming or graph-theoretic algorithms to recalculate changes in the tables from observed changes in the network. Each alternative has operational advantages for certain communications systems, and certain disadvantages for others. The appropriate techniques or combinations of techniques depend on several enumerated factors. The authors point out a number of research areas where further efforts in the analysis and simulation of such techniques will be useful in the design of future distributed communications systems. (Author)

AD-630 301 Fld. 17/2, 9/4, 9/2
CFSTI Prices: HC $2.00 MF $0.50
RAND CORP SANTA MONICA CALIF
A COMPUTER SIMULATION OF ADAPTIVE ROUTING TECHNIQUES FOR DISTRIBUTED COMMUNICATIONS SYSTEMS,
by B. W. Boehm, and R. L. Mobley. Feb 66, 42p. Rept. no. RM-4782-PR,
Contract AF 49 (638)-1700,
Unclassified report

Descriptors: (*Information theory, Programming (Computers)), (*Communication systems, Simulation), (*Queueing theory, Communication systems), Networks, Scheduling, Adaptive systems, Command + control systems, Mathematical models

Description of a computer model of a distributed communications system. It is written in FORTRAN IV and is designed to test various adaptive message routing techniques. The program simulates the progress of messages through the system

and measures the effects of the routing techniques' adaptation to specified degrees of destruction of its links and nodes. A listing of the program is given, plus the pitfalls to avoid in developing similar programs. (Author)

AD-630 478 Fld. 17/2, 5/10
SCHOOL OF AEROSPACE MEDICINE BROOKS AFB TEX PHYSIOLOGY BRANCH
VERBAL COMMUNICATION INTELLIGIBILITY IN OXYGEN-HELIUM, AND OTHER BREATHING MIXTURES, AT LOW ATMOSPHERIC PRESSURES.
Final rept.,
by Julian P. Cooke, and Sarah E. Beard. 1965, 10p. Rept. no. sam-TR-65-269,
Task 775801,
Unclassified report

Availability: Published in Aerospace Medicine v36 n12 p1167-72 Dec 1965. Copies to DDC users only.

Descriptors: (*Verbal behavior, Intelligibility), (*Voice communication systems, Environmental tests), Helium, Oxygen, Low-pressure research, Speech recognition, Speech, Flight, Simulation, Auditory perception

A total of 13 simulated flights with 25 subjects and 4 chamber operators were performed using some 8,300 numbers and words and 2,200 words in sentences to help evaluate communication intelligibility in oxygen at 5 and 3.5 psia, in oxygen-and-nitrogen at 7 psia, in oxygen-andhelium at 7 psia, and to compare these findings with those obtained in room air at ground level. Three-way communication was carried out between chamber subjects and ground level operators in room air. No statistically significant differences could be detected in test results when either words within sentences or random numbers were employed, but unrelated words resulted in statistically significant differences in some cases. The same order of magnitude or less of errors resulted in a reduced oxygen-and-helium environment as in an oxygen environment at the same oxygen partial pressure, thus indicating no new communication intelligibility problems are created by the addition of helium. Also, the effects due to tiring or lack of alertness create as many problems in room air as do the reduced pressures if subjects are alert. More errors result between subjects in test environments than between subjects and operators, in which case phone communication equipment is necessary. Most errors are of the rhyming type. (Author)

AD-630 496 Fld. 17/2, 9/4
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
PCM PICTURE TRANSMISSION,
by Thomas S. Huang. 1965, 7p. Contract DA-36-039-AMC-03200 (E) ,NSF-GP-2495
Unclassified report

Availability: Published in IEEE Spectrum v2 n12 p57-63 Dec 1965. Copies to DDC users only.

Descriptors: (*Pulse code modulation, *Television communication systems), (*Information theory, Television communication systems), Television equipment, Pictures, Video signals, Data transmission systems, Integrated circuits, Simulation, Digital computers

Research efforts on picture transmission by pulse code modulation falls into two categories: (1) Investigations on how the quality of the received picture depends on various system parameters; and (2) bandwidth compression techniques. Most of the studies have been done by digital computer simulation.

AD-630 254 **See Fld. 15/3**

17/2.1 RADIO COMMUNICATIONS

AD-630 473 Fld. 17/2.1, 9/5
CFSTI Prices: HC $3.00 MF $0.50
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS ANTENNA LAB
THE EFFECT OF A PURE TIME DELAY ON THE STABILITY OF A PHASE-LOCK LOOP.
Interim rept.,
by R. T. Compton Jr.. Feb 66, 52p. Rept. no. 1963-6,
Contract AF 30 (602)-3601, Proj. 4519, Task 451901,
RADC 65-232-Vol-2
Unclassified report

See also AD-630 472.

Descriptors: (*Phase-locked communication systems, Stability), Time-lag theory, Differential equations, Integral transforms, Feedback, Servo mechanisms, Satellites (Artificial), Tracking, Communication satellites (Passive), Signals, Delay circuits, Adaptive communication systems, Phase-locked systems

The report discusses the effect of 'transport lag' or pure time delay in the feedback loop of a phase-lock control system. The system analyzed is that which controls the relative phases of several transmitters to provide a coherent signal at a satellite. The report first derives the equation of the control loop, linearizes the resulting differential-difference equation, considers the loop to have unity compensation, and proceeds to discuss the solution. The results of this analysis are that, for stable operation, the loop gain may not exceed pi/2T for a time delay of T seconds, which results in a steady-state phase error of 2 omega (o)T/pi. (Author)

AD-630 190 **See Fld. 6/7**

AD-630 465 **See Fld. 9/4**

AD-630 472 **See Fld. 9/5**

17/3. DIRECTION FINDING

AD-630 034 **See Fld. 22/3**

17/9. RADAR DETECTION

AD-629 892 Fld. 17/9, 9/5, 9/1
CFSTI Prices: HC $2.60 MF $0.50
MOTOROLA INC SCOTTSDALE ARIZ MILITARY ELECTRONICS DIV
INTEGRATED CIRCUITS FOR COMBAT AREA EQUIPMENT.
Quarterly progress rept. no. 3, 1 Aug-1 Nov 65,
by C. D. Shupe, R. T. Paca, and T. T. Monaghan. Feb 66, 30p. Contract DA-28-043-AMC-01204 (E) Proj. DA-1P6-22001-A-056-02-23,
Unclassified report

See also AD-627 932.

Descriptors: (*Intergrated circuits, Gates (Circuits)), (*Gates (Circuits), Search radar), Filters (Electromagnetic wave), Switching circuits, Printed circuits, Range gating, Packaged circuits, Manufacturing methods, Processing, Transistors, Design, Moving target indicators

During the reporting period the fabrication of the four individual I/C chips of the I/C Range Gated Filter was in process. The status of the I/C, and the problems encountered in processing, are discussed. (Author)

AD-629 923 Fld. 17/9, 3/2, 4/1, 20/14
CFSTI Prices: HC $4.00 MF $0.75
LINCOLN LAB MASS INST OF TECH LEXINGTON
RADIO PHYSICS AND ASTRONOMY.
Semiannual technical summary, 1 Apr-30 Sep 65,
by James W. Meyer, and Paul B. Sebring. 3 Mar 66, 102p. Rept. no. 1965-1,
Contract AF 19 (628)-5167, Proj. 649L,
ESD TDR-65-492
Unclassified report

Descriptors: (*Radio astronomy, Instrumentation), (*Space surveillance systems, Radar tracking), (*Atmospheric sounding, Radar reflections), (*Radar antennas, Space surveillance systems), Radio telescopes, Solar systems, Radar scanning, Parabolic antennas, Satellite tracking systems

Much of the Laboratory's general research work in the fields of radio physics and astonomy is done with the facilities and by the staff on the Laboratory's Millstone Hill Field Station. This first issue of the Radio Physics and Astronomy report is intended not only to report our most recent research findings and experiment preparations in these fields, but also to provide sufficient background in our past work to give the reader an overall acquaintanceship with the extent and history of such work at Lincoln Laboratory. Radar measurements on the moon and nearer planets with the Millstone radar are described, as are preparations for similar, more accurate measurements at Haystack Hill. Applications of techniques that were developed for radar astronomy to the improved detection and tracking of artificial satellites are also described. Studies of the electron and ion behavior in the ionosphere continue and the results are being co-ordinated with work elsewhere. Haystack Hill, the newest facility, is still in its early operating phase, with much of the effort of the station complement going into its increasingly complex instrumentation. (Author)

AD-629 936 Fld. 17/9, 9/2
CFSTI Prices: HC $14.60 MF $1.00
LINCOLN LAB MASS INST OF TECH LEXINGTON
HAYSTACK POINTING SYSTEM: AUXILIARY REAL-TIME PROGRAMS.
Technical note,
by John D. Drinan. 31 Jan 66, 150p. Rept. no. TN-1966-6,
Contract AF 19 (628)-5167, Proj. AF-649L,
ESD TDR-66-21
Unclassified report

Descriptors: (*Radar antennas, Steering), (*Radio telescopes, Steering), Programming (Computers), Command + control systems, Intercommunication systems, Space surveillance systems, Radar equipment, Massachusetts

A description is given of ten non-major subprograms in the Haystack Pointing System. These programs all operate in the real-time environment, but in a sense are embellishments to the system proper inasmuch as they are by design either utilitarian to system operation or perform minor system functions. The additional system capabilities provided by this set of subprograms include: alteration of memory locations; modification of certain system parameters; constant monitoring of selectable memory locations; pointing of the antenna to any azimuth and elevation or right ascension and declination; outputting of certain planning information 'on-line'; strip chart recording; magnetic tape recording; high-speed printer interfacing and Westford/Millstone intersite coupling. (Author)

AD-630 193 Fld. 17/9, 9/2
CFSTI Prices: HC $18.50 MF $1.00
LINCOLN LAB MASS INST OF TECH LEXINGTON
HAYSTACK POINTING SYSTEM: PERIPHERAL PROGRAMS.
Technical note,
by J. D. Drinan. 17 Feb 66, 189p. Rept. no. TN-1966-13,
Contract AF 19 (628)-5167 Proj. AF-649L,
ESD TDR-66-43
Unclassified report

See also AD-629 936.

Descriptors: (*Radio telescopes, Steering), (*Radar antennas, Steering), Programming (Computers), Space surveillance systems, Radar equipment, Punched cards, Magnetic tape, Massachusetts

A set of eight non-real-time service programs was written in support of the Haystack Pointing System to facilitate system maintenance and updating. Peripheral functions afforded by this set of programs include: (1) format conversion and remote printing facility of the SPURT assembler printer outputs 210, 211 and 212; (2) magnetic tape dumping; (3) 'effective' punched card input to SPURT assembler; (4) CalComp plotting of system output; (5) punched card equivalents of Common Storage Allocation Tape; (6) automatic program loading with bootstrap tape generation facilities; (7) magnetic tape duplication; and (8) automatic updating of system tapes. (Author)

AD-630 202 Fld. 17/9
CFSTI Prices: HC $1.00 MF $0.50
NAVAL RESEARCH LAB WASHINGTON D C
POLAR VIDEO GATING OF RADAR AND IFF DISPLAYS USING CARTESIAN CONTROL.
Interim rept.,
by F. R. Fluhr. 21 Feb 66, 14p. Rept. no. NRL-6372,
Proj. SF-001-10-01-6106,
Unclassified report

See also AD-206 586, AD-460 781.

Descriptors: (*Radar equipment, Display systems), (*Identification systems, Display systems), (*Range gating, Radar equipment), (*Azimuth gating, Identification systems), Plan position indicators, Data processing systems, Cathode ray tubes, Video signals, Position finding, Track-while-scan

Many data-processing operations require the rapid and accurate extraction of position data from cathode -ray-tube information sources such as radar, IFF, and sonar PPI repeaters. An IFF Active Readout System under development required gating out IFF video responses at positions controlled by a hook position marker. In this implementation, the hook marker is presented on the PPI in x-y coordinates during the radar repeater recovery or retrace period. A means was devised of developing a video gate control which gates the video with a constant angular width and constant range depth using the x and y dc hook position voltages and the PPI repeater resolved x and y sweep voltages. The computation uses an analog approximation technique which is relatively simple. The approximation deviates from the ideal less than 0.5% for a 10 degree angular width gate. This deviation can be eliminated by the addition of a simple compensation scheme. The video gating method can be implemented digitally for those PPI displays using digital sweeps. (Author)

AD-630 249 Fld. 17/9
CFSTI Prices: HC $4.60 MF $0.50
ARMY ENGINEER GEODESY INTELLIGENCE AND MAPPING RESEARCH AND DEVELOPMENT AGENCY FORT BELVOIR VA
MICROWAVE POINTING VARIATIONS AND ANGLE MEASUREMENTS,
by Peter J. Cervarich. Jan 66, 47p. Rept. no. 26-TR,
Proj. DA-4A623501A85201, Task 4A623501A85201-011,
Unclassified report

Descriptors: (*Direction finding, Microwave equipment), (*Probes (Electromagnetic), Microwave equipment), (*Microwave equipment, Range finding), (*Angle of arrival, Probes (Electromagnetic), Interferometers, Temperature, Atmospheric motion, Optical equipment, Radio signals, Frequency

Tests were performed to obtain simultaneous data pertaining to the long-term and short-term signal angle-of-arrival variations at 9.4, 18.8, and 35 Gc/s frequencies being transmitted over the same path as detected by three existing systems; and to perform angle determinations using the 35 Gc/s system. Analyses of data indicate that the short-term variations are greater with the 35 Gc/s system than with the 18.8 Gc/s system, but are more symmetrical about the long-term mean; that the long-term variations are shortest with the 35 Gc/s system; that both short-term and long-term variations with the 9.4 Gc/s system are much greater than the other systems; and that angle determinations within a few arc seconds are achievable when the 35 Gc/s interferometer is used. Some correlation with temperature is indicated, and an explanation for the cause of short-term effects and the relative influence of long-term variations on the angle measurements is discussed. No explanation is offered for the apparent reduced sensitivity of the higher frequency systems to either long-term variations or atmospheric parameters. (Author)

AD-629 988 **See Fld. 4/2**

17/10. SEISMIC DETECTION

AD-630 515 **See Fld. 8/11**

Field 18-NUCLEAR SCIENCE AND TECHNOLOGY

18/2. ISOTOPES

AD-630 302 Fld. 18/2, 7/5
CFSTI Prices: HC $1.00 MF $0.50
NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF
ANALYSIS OF CS134-CS137 MIXTURES BY GAMMA -RAY SPECTROMETRIC METHODS,
by Sachio Yamamoto. 9 Jan 66, 25p. Rept. no. USNRDL-TR-934,
Contract AT (49-2)-1167,
Unclassified report

Descriptors: (*Cesium, Gamma-ray spectra), (*Gamma-ray spectroscopy, Cesium), Pulse height analysis, Least squares analysis, Coincidence counting, Radioactive isotopes

Cs134-Cs137 mixtures were analyzed by gamma-gamma coincidence spectrometry and by least-squares analysis of non-coincident gamma-ray pulse-height spectra. The sensitivity and accuracy of the two methods were evaluated and compared. Particular attention was paid to mixtures with low Cs134 content. Known mixtures of Cs134 and Cs137, whose Cs134/Cs137 count-rate ratios ranged from 0.002 to 8, were prepared and analyzed by both methods. The accuracy and precision of the coincidence measurements for mixtures with count-rate ratios between 0.01 and 0.002 were 5% or better, and for ratios higher than 0.01 they were 1%. The gamma-gamma coincidence method proved to be far more sensitive than the least-squares analysis of non-coincident gamma-ray spectra. In the latter case, Cs134 could not be detected in mixtures with ratios below 0.01. However, the leastsquares method was found to be more sensitive than other non-coincident gamma-ray spectrometric methods. It could be used to analyze mixtures with Cs134-Cs137 ratios down to 0.01, although precision is poor at the lower range. (Author)

18/3. NUCLEAR EXPLOSIONS

AD-629 883 **See Fld. 19/4**

AD-629 985 **See Fld. 8/14**

18/4. NUCLEAR INSTRUMENTATION

AD-630 229 Fld. 18/4, 20/8, 14/2
NEW SOUTH WALES UNIV KENSINGTON (AUSTRALIA) DEPT OF NUCLEAR AND RADIATION CHEMISTRY
TIME MATCH OF PULSES AND TIME RESOLUTION OF A TIME-TO-AMPLITUDE CONVERTER,
by S. J. Tao, J. Bell, and J. H. Green. 3 Feb 65, 10p. Contract AF-AFOSR-62-398,
AFOSR 66-0282
Unclassified report

Availability: Published in Nuclear Instruments and Methods v35 p222-8 1965. Copies to DDC users only.

Descriptors: (*Positrons, Annihilation reactions), (*Annihilation reactions, Measurement), Instrumentation, Life expectancy, Nuclear particles, Photomultipliers, Radiation measurement systems, Gamma rays, Australia

The theory of matching of the time pulses and the double coincidence pulses for a time-to-amplitude converter is discussed and extended. The time spread introduced by the phosphor, photomultiplier, gamma-ray spectrum and other factors is analysed. (Author)

AD-630 230 Fld. 18/4, 20/8, 14/2
NEW SOUTH WALES UNIV KENSINGTON (AUSTRALIA) DEPT OF NUCLEAR AND RADIATION CHEMISTRY
CONSTRUCTION AND PERFORMANCE OF A FAST TIME-TO-AMPLITUDE CONVERTER,
by J. Bell, S. J. Tao, and J. H. Green. 3 Feb 65, 11p. Contract AF-AFOSR-62-398,
AFOSR 66-0398
Unclassified report

Availability: Published in Nuclear Instruments and Methods v35 p213-21 1965. Copies to DDC users only.

Descriptors: (*Positrons, Annihilation reactions), (*Annihilation reactions, Measurements), Instrumentation, Life expectancy, Photomultipliers, Radiation measurement systems, Gamma rays, Australia

A subnanosecond time-to-amplitude converter based on the pulse overlap principle and including a pair of fast transistorized single channel analyzers for side channel pulse discrimination is described. The presence of machine background and natural background in addition to the random background is discussed. A high degree of stability and linearity is achieved. The machine time resolution is about 0.12 ns and when it is coupled with a pair of RCA6810A photomultipliers the total resolution is less than 0.7 ns. (Author)

AD-630 239 Fld. 18/4, 9/5
FLORIDA STATE UNIV TALLAHASSEE DEPT OF PHYSICS
A 'LEAKY' INTEGRATOR CIRCUIT WITH AUTOMATIC SWITCHING,
by D. T. Birch, and J. W. Nelson. 24 Feb 65, 10p. Contract AF-AFOSR-440-65,
AFOSR 66-0106
Unclassified report

Availability: Published in Nuclear Instruments and Methods v35 p293-300 1965. Copies to DDC users only.

Descriptors: (*Radiation measurement systems, Integrators), (*Integrators, Radiation measurement systems), Nuclear reactions, Nuclear cross sections, Excitation, Measurement, Circuits, Wiring diagrams, Automatic, Switching circuits

An electromechanical system for cross section

nd excitation curve measurements by counting residual radioactivity is described. The principle of operation of the 'leaky' integrator is discussed. Circuits are described in detail and examples of experiments performed with the aid of the equipment are given. (Author)

AD-630 058 See Fld. 14/2

18/5. NUCLEAR POWER PLANTS

AD-630 360 See Fld. 18/9

18/6. RADIATION SHIELDING AND PROTECTION

AD-630 423 Fld. 18/6, 13/1
CFSTI Prices: HC $3.00 MF $0.50
GENERAL AMERICAN RESEARCH DIV GENERAL AMERICAN TRANSPORTATION CORP NILES ILL
EXPERIMENTAL STUDIES OF FALLOUT SHELTER VENTILATION REQUIREMENTS.
Final rept., Oct 62-Sep 64,
by H. F. Behls, and C. A. Madson. Oct 65, 53p.
Rept. no. GARD-1268-40,
Contract OCD-PS-64-201, Proj. OSA-1200,
Task 1210,
Unclassified report

Descriptors: (*Fallout shelters, *Ventilation), Temperature, Humidity, Confined environments, Gas flow, Test equipment, Test methods, Experimental data

The results of two years' field testing of fallout shelters is reported herein. Simulated occupants Simocs) and forced flow conditioned air were used to duplicate emergency environmental conditions. Nine tests have previously been documented in detailed Interim Reports. Based on field measurements of temperature, humidity and heat ux, and supplemented by an analytical computer program, an 'adiabatic' procedure is recommended to predict shelter environmental conditions. This adiabatic procedure neglects heat transmission hrough the shelter boundary surfaces and can predict shelter effective temperatures to within 2F. The procedure is conservative in that it will over-estimate the shelter temperature for all shelters tested. (Author)

18/8. RADIOACTIVITY

AD-630 436 Fld. 18/8, 20/8
CALIFORNIA INST OF TECH PASADENA
ELECTROMAGNETIC DECAY OF THE 1.7- AND 2.43-MEV LEVELS IN 9BE,
by Paul Purdom,Jr., P. A. Seeger, and R. W. Kavanagh. 31 Jan 66, 34p. Contract Nonr-220 (47),
Unclassified report

Availability: Published in Nuclear Physics 31 Jan 66. Copies to DDC users only.

Descriptors: (*Beryllium, Radioactive decay), (*Nuclear energy levels, Beryllium), Boron, Deuteron bombardment, Alpha spectra, Recoil atoms, Gamma emission, Electrons, Inelastic scattering

The 1.7- and 2.43-MeV levels in Be9 were populated with the reaction B11 (d, alpha)Be9* by bombarding thin boron on carbon foils with 1.7-MeV deuterons. The alpha particles were analyzed in nergy with a surface-barrier counter set at the kinematically determined angle corresponding to recoiling Be9 nuclei at theta-lab=90 degrees. The latter were analyzed in rigidity with a magnetic spectrometer, in energy by a surface-barrier counter at the spectrometer focus, and in velocity by the time delay between an alpha and a Be count. Most of the Be9* decay by particle breakup. Only those that gamma decay are detected by the spectrometer counter. Thus the experiment provides a direct measurement of Gamma -rad/Gamma. Analysis of 384 observed events gives Gamma-rad/Gamma = (1.16 plus or minus 0.14) × 0.0001 for the 2.43-MeV level. Combining this ratio with the value of Gamma-rad = 0.122 plus or minus 0.015 eV found from inelastic electron scattering gives Gamma = 1.05 plus or minus 0.18 keV. For the 1.7-MeV level, an upper limit, Gamma-rad/Gamma < or = 0.000024, was determined. (Author)

AD-629 948 See Fld. 9/1

AD-630 032 See Fld. 20/8

AD-630 344 See Fld. 9/1

AD-630 349 See Fld. 20/8

18/9. REACTOR ENGINEERING AND OPERATION

AD-630 360 Fld. 18/9, 18/5, 18/10, 18/11, +
CFSTI Prices: HC $2.00 MF $0.50
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
FRENCH NUCLEAR REACTOR DEVELOPMENT: COMPREHENSIVE REPORT,
by Anatol Surak. 16 Dec 65, 48p. Rept. no. ATD-65-115,
TT 66-60825
Unclassified report

Rept. on Surveys of Western Open Literature.

Descriptors: (*Nuclear reactors, France), Test reactors, Research reactors, Nuclear engineering, Symposia, Research facilities, Nuclear industrial applications, Heavy water reactors, Fast reactors, Scientific personnel, Reactor materials, Reactor coolants, Reactor fuel elements, Power reactors, Heat-resistant alloys, France

This comprehensive report is based on Western open sources published 1958-1965. Various aspects of French nuclear reactor development are reviewed. Special emphasis is placed on research and test reactors and topics related to advanced reactor technology. The relations between and the contributions of the various controlling agencies, professional associations, and industrial concerns in the nuclear field are discussed. A brief description is presented of French nuclear-reactor research centers and of reactors now in operation or under construction. The seven chapters are titled as follows: controlling agencies, industry, associations, research centers, experimental research and test reactors, fast reactors, advanced reactor development. The Appendix covers the following: CEA organization diagram, 1 January 1965; reactor index. There are 13 references listed at the end of the report; in addition, short references totaling 80 are also cited under the description of each individual reactor. (Author)

AD-629 881 See Fld. 18/10

AD-630 245 See Fld. 9/2

18/10. REACTOR MATERIALS

AD-629 881 Fld. 18/10, 18/9
CFSTI Prices: HC $1.00 MF $0.50
NAVAL RESEARCH LAB WASHINGTON D C
RADIATION DAMAGE SURVEILLANCE OF POWER REACTOR PRESSURE VESSELS.
Interim rept.,
by C. Z. Serpan,Jr., I. E. Steele, and J. R. Hawthorne. 31 Jan 66, 23p. Rept. no. NRL-6349,
Contract AT (49-5)-2110, Proj. RR-007-01-46-5409 ,SR-007-01-01 Task 0858,
Unclassified report

Descriptors: (*Radiation damage, Pressure vessels), (*Pressure vessels, Radiation damage), (*Power reactors, Pressure vessels), Neutron flux, Life expectancy, Transition temperature, Nuclear power plants, Mechanical properties, Reactor safety systems, Reactor system components

The deleterious effect of high energy neutrons upon the mechanical properties of reactor pressure vessel steels has prompted the employment of material surveillance programs in many nuclear power plants. These programs provide for the exposure of test specimens representative of the reactor pressure vessel at in-reactor locations, wherein they will experience the same thermal and radiation damage history as the vessel itself. Evaluation of these specimens, which reveals the progressive changes in the mechanical properties of the vessel, provides a basis upon which operational procedures and maximum lifetime exposure may be formulated for the plant. A review and an analysis of several instances of shortcomings in surveillance programs are presented along with a set of recommendations for consideration in planning new surveillance programs. In utilizing these recommendations, pressure vessel surveillance programs can be made to provide valuable information for use in determining plant operations; at the same time results from these programs may add to the general knowledge of radiation effects in pressure vessel steels or other materials subject to radiation. Recognition of the value of surveillance programs and their conscientious application should further the public acceptance of nuclear reactors as safe alternative power systems.

AD-630 360 See Fld. 18/9

18/11. REACTOR PHYSICS

AD-630 360 See Fld. 18/9

AD-630 360 See Id. 18/9

18/12. REACTORS (POWER)

AD-630 360 See Fld. 18/9

18/13. REACTORS (NON-POWER)

AD-630 360 See Fld. 18/9

Field 19-ORDNANCE

19/1. AMMUNITION, EXPLOSIVES, AND PYROTECHNICS

AD-629 767 Fld. 19/1, 14/2, 19/4
CFSTI Prices: HC $2.60 MF $0.50
PICATINNY ARSENAL DOVER N J
FRAGMENTATION TESTING PROCEDURES.
Testing manual.
24 Aug 50, 21p. Rept. no. PA-Manual-5-1,
Unclassified report

Descriptors: (*Ordnance, Fragmentation), (*Fragmentation, Test methods), Test facilities, Ordnance laboratories, Test equipment

A fragmentation test consists of static functioning the explosive filler of a projectile, rocket, bomb, mine, etc, for the purpose of determining the number and weight groupings of the recovered fragments. The manual describes standard techniques for conducting a fragmentation test of an HE-loaded item in a closed chamber or pit. A pit fragmentation test is conducted to determine the average mass distribution for the entire item without regard for local origin of fragments. All fragments are collected insofar as possible for study of weight, number, and the size of the fragments produced. The fragmentation chamber is an expensive piece of equipment, therefore, it shall not be used for the testing of explosives greater in power than 8 or 16 pounds of Composition B in sawdust or sand, respectively.

AD-629 780 Fld. 19/1, 21/2, 21/4, 21/9
CFSTI Prices: HC $1.00 MF $0.50
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
THE THEORY OF DETONATION, THE COMBUSTION MECHANISM, AND THE PROPERTIES OF EXPLOSIVES: COMPILATION OF ABSTRACTS.
Rept. no. 4 on ATD work assignment no. 70,
by Seraphim Parandjuk. 21 Dec 65, 23p. Rept. no. ATD-65-116,
TT 66-60748

Unclassified report

Based on Soviet open literature. Rept. on Surveys of Soviet Scientific and Technical Literature.

Descriptors: (*Explosive materials, Detonations), (*Combustion, Explosive materials), (*Detonations, Explosive materials), Ignition, Heat transfer, Detonation waves, Propagation, Burning rate, Solids, Flame propagation, Theory, Propellants, Temperature, Thermodynamics, Solid state physics, Abstracts, USSR

The compilation of abstracts is based on Soviet -Satellite open sources published in 1965. This is the fourth report in this series dealing with the theory of combustion, the combustion mechanism, and the properties of explosives. Other information included: pressure increase in the combustion front; channel effect in explosive detonation; thermal self-ignition; steady -state powder combustion; low-velocity detonation inpowdered explosives; additive; thermal decomposition; octogen; condensed zone burning; explosive decomposition, ethylene oxide; nitroglycerin; static electricity. There are 30 abstracts and no references. (Author)

AD-629 884 Fld. 19/1, 7/2
CFSTI Prices: HC $1.60 MF $0.50
PICATINNY ARSENAL DOVER N J
STUDY PROPERTIES OF TETRAMMINO CUPRIC NITRATE.
Rept. no. 1 (final),
by A. J. Phillips. 28 Jun 43, 13p. Rept. no. PA-TN-1302,

Unclassified report

Descriptors: (*Copper, Compatibility), (*Explosive materials, Compatibility), (*Nitrates, Compatibility), Ammonium compounds, Copper compounds, Storage, Containers, Corrosion, Copper alloys

In order to obtain information regarding the degree of hazard involved in the use of copper or copper alloys in equipment used for the manufacture of amatol, storage tests were made at 50C, of copper foil in contact with ammonium nitrate, 80-20 and 50-50 amatols containing various percentages of moisture, in both open and closed containers. It was found that in closed containers, a sensitive, purple tetramino cupric nitrate was formed very readily in the presence of ammonium nitrate, less readily in the presence of 80-20 amatol and to little or no extent with 50-50 amatol. In open containers under the same storage conditions, there was no formation of the sensitive purple salt. In all cases except those in which the minimum amount of moisture was present, there was corrosion of the copper strips with the formation of blue and green basic nitrates, and it was found that at normal temperatures, these basic nitrates would react with the copper metal to form the sensitive purple salt. It is concluded that this work substantiates the requirement in specifications that no copper or copper alloys may be used in any part of the equipment which may come into contact with amatol, during its manufacture. (Author)

AD-630 026 Fld. 19/1
CFSTI Prices: HC $1.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
SENSITIVITY OF EXPLOSIVES TO MECHANICAL EFFECTS AND METHODS OF INCREASING THEIR STABILITY,
by G. T. Afanasev, V. K. Bobolev, and I. A. Karpukhin. 20 May 65, 9p. Rept. no. TG-230-T451, Contract NOw-62-0604-c,
TT 66-60762

Unclassified report

Trans. of Vzryvnoe Delo (USSR) 52/9 p5-10 1963.

Descriptors: (*Explosive materials, Stability), (*Explosions, Mechanics), Sensitivity, Reduction, Autoignition, Creep, Pressure, Plasticity, Deformation, USSR, Impact shock, Loading (Mechanics), Eutectics, Additives

Several methods of decreasing the sensitivity of explosives are presented.

AD-630 043 Fld. 19/1
PITMAN-DUNN RESEARCH LABS FRANKFORD ARSENAL PHILADELPHIA PA
EFFECTS OF SOME OF THE SPACE ENVIRONMENTS ON PROPELLANT ACTUATED DEVICES,
by Maurice H. Simpson. 1966, 18p.

Unclassified report

Availability: Published in Inst. of Environmental Sciences, proceedings, Chicago, Ill., Apr 11, 12, 13, 1962. No copies furnished.

Descriptors: (*Cartiridges (PAD), Damage), (*Space environmental conditions, Cartridges (PAD)), Radiation damage, Ozone, Solar radiation, Acceleration, Altitude, Performance (Engineering), Environmental tests, Ballistics

The investigation covers the effects found of the space environments of ozone, solar radiation, nuclear radiation, acceleration, temperature, and altitude. Apparent physical damage and the effects on ballistic (firing) performance are analyzed. Changes in chemical composition, internal pressures and other operational criteria are also evaluated. The paper discusses the resulting failures caused by these environmental factors of space. The results show that the effects of ozone and solar radiation were the most critical. (Author)

AD-630 357 Fld. 19/1, 19/6
CFSTI Prices: HC $3.60 MF $0.50
FELTMAN RESEARCH LABS PICATINNY ARSENAL DOVER N J
TEMPERATURE SENSITIVITY OF THE T324E22 VIGILANTE HE CARTRIDGE-GUN SYSTEM.
Technical memo. rept.,
by Robert J. Heredia, and Stanley J. Lowell. Jul 60, 36p. Rept. no. ORDBB-TE9-30

Unclassified report

Descriptors: (*Weapon systems, Performance (Engineering)), (*Cartridges, Cook-off), Dual purpose guns, High-explosive ammunition, System engineering, Firing tests (Ordnance), Thermal properties, Sensitivity

Heat tests were made with the individual components and the complete T324E22 HE cartridges. Results of these tests indicate that the T28E1 propellant has the lowest cook-off temperature, 239F. The next lowest was the T300 base fuze tetryl booster lead with a temperature of 275F. Of four cook-off tests conducted with a complete HE loaded T324E22 cartridge, the lowest cook-off temperature recorded was 262F when the round in gun barrel was not preheated. Results of gun firing tests of the 37mm T324E22 cartridge containing live propellant and inert HE systems were compared with results of static cook-off tests. These results indicated that the lowest temperature recorded before cook-off occurred was 237F at the cartridge case area. This temperature was achieved with seven 48-round bursts and was 2F below the cook-off temperature of the T28E1 propellant. At nine bursts the temperature in the same area was 250F. The explosive MAX-2 had a cook-off temperature of 385F when it was tested. The temperature of the area in the gun where the explosive was located after firing seven 48-bursts was 311F maximum. After nine such bursts the temperature increased to 395F. (Author)

AD-630 358 Fld. 19/1, 13/8
CFSTI Prices: HC $1.60 MF $0.50
FELTMAN RESEARCH LABS PICATINNY ARSENAL DOVER N J
AMMUNITION LOADING TECHNIQUES,
by Martin J. Margolin, and Edward A. Skettini. Dec 58, 13p. Rept. no. 43,

Unclassified report

Descriptors: (*Ammunition, Manufacturing methods), (*Eplosive materials, Casting), Mechanical working, Melting, Production

In general, two methods of loading explosives into ammunition are in use, first, casting (referred to as melt-loading) and secondly pressing, or consolidation by means of pneumatic or hydraulic presses. The latter is used for loading detonators, and making small pellets for boosters, and also for loading shell with explosives which have melting temperatures too high to make melt-loading feasible. The former method, casting, is usually the more economical of the two, and is used as universally as possible. The bulk of of this report deals with melt-loading. All standard present day melt-loaded explosives melt as a temperature of about 176F (80C). However, the optimum casting or loading temperature for most of these explosives ranges from about 1C to 10C above the melting temperature. All castable explosives shrink upon changing from the liquid to the solid state. Therefore, whenever possible, provision must be made to supply a reservoir or riser of molten explosive above the loading opening in the item. This riser will then supply additional molten explosive to the main charge in the item to fill up any shrinkage cavitation which may have occurred during the initial charge solidification. (Author)

19/2. BOMBS

AD-630 242 Fld. 19/2
CFSTI Prices: HC $3.60 MF $0.50
FRANKFORD ARSENAL PHILADELPHIA PA PROPELLANT ACTUATED DEVICES DIV
DEVELOPMENT OF M117 BOMB PARACHUTE RETARDATION DEPLOYMENT SYSTEM.
Technical research rept.,
by Bruce W. Travor. Dec 65, 38p. Proj. AF-MIPR-PG-4-45,
FA R-1791

Unclassified report

Descriptors: (*Bombs, Parachutes), Ejection, Cartridges (PAD), Deployment

As a means of achieving a controlled rapid ejection -retardation effect for correct deployment of the M117 bomb, Frankford Arsenal developed a propellant-powered parachute system capable of obtaining the specific velocity-time sequence required to properly retard the forward velocity and descent of the bomb. The work performed included the design of a bomb tail section containing the parachute and deployment system, ballistic tests to establish a propellant charge, and the manufacture of test devices for an aerial drop program. The test devices were assembled to M117 bombs at Kirtland Air Force base and successfully subjected to ground testing and partially successfully to aerial drop testing. (Author)

19/4. EXPLOSIONS, BALLISTICS, AND ARMOR

AD-629 864 Fld. 19/4
CFSTI Prices: HC $1.00 MF $0.50
DEPARTMENT OF THE NAVY WASHINGTON D C
CALCULATION OF THE COMPOSITION OF

THE PRODUCTS OF DETONATION AND DETONATION PARAMETERS OF CONDENSED EXPLOSIVES,
by V. N. Zubarev, and G. S. Telegin. 1966, 11p. Rept. no. Translation-2110, TT 66-60756

Unclassified report

Raschet Sostava Produktov Vzryvz i Parametrov Detonatsii Kondensirovannykh V. V., trans. of Akademiya Nauk SSSR. Doklady, v158 n2 p452-5.

Descriptors: (*Detonations, Explosion gases), (*Explosion gases, Chemical analysis), Concentration (Chemistry), Chemical equilibrium, Hydrogen, Carbon monoxide, USSR

A determination was made of the formation tendencies, in the products of detonation, CO and H2, the concentrations of which are determined by the conditions of the chemical equilibrium.

AD-629 883 Fld. 19/4, 18/3
CFSTI Prices: HC $2.60 MF $0.50
STANFORD RESEARCH INST MENLO PARK CALIF
EVALUATION OF MISSILE HAZARD, UNDERGROUND SHOT,
by R. B. Vaile,Jr., and V. Salmon. May 52, 25p. AEC WT-338

Unclassified report

Rept. on Operation Jangle, Project 4.5.

Descriptors: (*Underground explosions, Debris), (*Nuclear explosions, Underground explosions), Airburst, Nuclear explosion damage, Explosion effects, Surface burst, Buildings, Airplanes

The missile experiment demonstrated that reinforced concrete walls and highways located 40 feet to 140 feet from ground zero were broken and thrown out as missiles. Material nearer than 40 feet (or perhaps 50 feet) was vaporized or pulverized to the extent that it was largely windborne. Missiles of military significance were found 400 feet to 3300 feet from ground zero. Those of major significance were in the range 400 feet to 1500 feet. Analysis has permitted estimates of the missile hazard from an underground explosion of roughly 25 times the energy release of the JANGLE underground explosion (and at the same scaled depth) fired under a continuous reinforced concrete runway 18 inches thick. It is predicted that missiles would produce serious damage to buildings out to a radius of 1100 feet and to airplanes out to 3000 feet. These figures should be compared to estimates that the air blast from such an explosion would damage buildings to 2200 feet and airplanes to 6000 feet. It is concluded that on large shallow underground explosions damage by the mechanism of air blast will extend farther than damage by the mechanism of missiles. (Author)

AD-629 767 **See Fld. 19/1**

AD-629 921 **See Fld. 20/11**

19/6. GUNS

AD-630 278 **See Fld. 21/4**

AD-630 357 **See Fld. 19/1**

Field 20-PHYSICS

20/1. ACOUSTICS

AD-629 932 Fld. 20/1
CFSTI Prices: HC $1.00 MF $0.50
NAVY MINE DEFENSE LAB PANAMA CITY FLA
ACOUSTIC DETERMINATION OF BUBBLE SIZE DISTRIBUTION.
Final rept., 12 Jul-24 Sep 65,
by GHarry D. Smith,Jr., and Edward L. Pipkin. Feb 66, 25p. Rept. no. RR-286, Proj. SF-011-01-01, Task 0401-11,

Unclassified report

Descriptors: (*Bubbles, Physical properties), Acoustics, Photographic analysis, Measurement, Distribution, Feasibility studies

The purpose of the investigation was to determine the feasibility of measuring bubble size distributions acoustically. The experiment consisted of a comparison of a photographically and an acoustically determined bubble size distribution of an electrolytically generated bubble screen. The approximate range of bubble radii considered was from 15 to 85 microns. Results indicate the acoustic method may be reasonably accurate in determining a relative bubble size distribution for spherical bubbles with radii greater than 32 microns, but more information is needed about the damping constants of nonresonant bubbles; and a more precise evaluation of an integral in the acoustical theory is needed before the validity of the acoustical method can be established. (Author)

AD-630 033 Fld. 20/1
CFSTI Prices: HC $2.60 MF $0.50
CATHOLIC UNIV OF AMERICA WASHINGTON D C
NUMERICAL DISCUSSION OF CREEPING ACOUSTICAL WAVES AROUND CYLINDERS. SOUND SCATTERING BY ELASTIC CYLINDRICAL SHELLS,
Rept. for Underwater Acoustics Program,
by H. Uberall, R. D. Doolittle, and J. V. McNicholas. Dec 65, 29p. Rept. no. 2-65, Contract Nonr-2249 (08)

Unclassified report

Descriptors: (*Acoustics, Cylindrical bodies), (*Sound, Scattering), Sound transmission, Diffraction, Elasticity, Solids, Fluids

The report presents the solution for the scattered field corresponding to a plane sound wave incident upon an infinite elastic circular-cylindrical concentric shell, imbedded in a fluid and enclosing another fluid. The results are shown to contain the known special cases of fluid and elastic solid cylinders. Furthermore, limiting expressions for long wavelengths are obtained in special cases. The second part of this report is a sequel to a previous report (AD-625 793) 'Pulsed Creeping Waves in Acoustics', which discussed diffraction of sound waves and pulses by cylinders. Graphical illustrations are presented of some aspects of the creeping waves, in particular their velocities and damping for rigid and soft cylinders, the backscattering cross section for rigid cylinders, and the shape of the head of the diffracted pulses. It is found that only very few creeping waves already give an excellent approximation to the exact solution for large and even moderately large values of ka. (Author)

AD-630 159 Fld. 20/1
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
PHYSICAL ACOUSTICS,
by K. U. Ingard, L. W. Dean,III, K. W. Gentle, C. T. Dum, and R. H. Katyl. 1966, 4p. Contract Nonr-1841 (42),DA-36-039-AMC-03200 (E)

Unclassified report

Availability: Published in Research Lab. of Electronics Quarterly progress rept. n80 p75-7 Jan 15 1966. Copies to DDC users only.

Descriptors: (*Acoustics, Compressible flow), (*Compressible flow, Acoustics), Fluids, Equations of motion, Equations of state, Sound, Light

The paper considers the effect of the compressibility of a fluid on the dispersion relation of surface waves, and examines the contribution of the bulk viscosity to the damping coefficient of the waves.

AD-630 326 Fld. 20/1, 20/4
CFSTI Prices: HC $3.00 MF $0.50
BROWN UNIV PROVIDENCE R I DIV OF ENGINEERING
ATTENUATION AND DISPERSION OF SOUND BY PARTICULATE RELAXATION PROCESSES.
Summary rept.,
by Samuel Temkin. Feb 66, 37p. Contract Nonr-562 (37),

Unclassified report

Descriptors: (*Sound transmission, Aerosols), (*Aerosols, Sound transmission), (*Acoustics, Aerosols), Relaxation time, Attenuation, Scattering, Fluid mechanics

The temperature and velocity of a particle suspended in an acoustic field are subject to fluctuations which may lag behind those of the surrounding fluid. A theory for acoustic attenuation and dispersion in an aerosol based on these particulate relaxation processes is given. The close relationship between particulate relaxation and relaxation mechanisms due to lagging molecular or atomic internal degrees of freedom is displayed. The particulate relaxation theory predicts attenuation and dispersion by small, heavy particles in close agreement with existing, more detailed theories, for values of omega (tau omega = circular acoustic frequency, tau = dynamic relaxation time of the particle) smaller than and including order unity. Comparison with existing experimental data of attenuation and dispersion due to Zink and Delsasso shows good agreement. However, the existence of a maximum attenuation per wavelength, when omega tau nearly equal to 1, that is predicted by the theory is not tested by the above experiments which were conducted with omega tau > 1. Similarly, the maximum dispersion which occurs at the low frequency limit was not tested in the previous experiments. (Author)

AD-630 351 Fld. 20/1, 17/1
NAVY UNDERWATER SOUND REFERENCE LAB ORLANDO FLA
RECIPROCITY CALIBRATION IN A TUBE WITH ACTIVE-IMPEDANCE TERMINATION.
Research rept.,
by Louis G. Beatty. 1 Apr 66, 11p. Rept. no. USRL-RR-82,

Unclassified report

Availability: Published in The Journal of Acoustical Society of America v39 n1 p40-7 Jan 1966. Copies to DDC users only.

Descriptors: (*Electroacoustic transducers, Calibration), (*Calibration, Electroacoustic transducers), (*Underwater sound equipment, Calibration), Deep submergence, Acoustic impedance, Sound transmission, Measurement

A new application of the reciprocity principle has been developed for calibrating electroacoustic transducers in a closed vessel at static pressures to 8500 psi and frequencies from 100 to 1500 Hz. The necessary plane progressive wavefield is provided by sound propagation in the longitudinal mode within a sound channel terminated at both ends with active impedances. The technique is particularly well suited to the calibration of underwater-sound transducers because the high static pressure under which many of them must operate, as well as their size, mechanical construction, and operating frequency, often prevents the use of more conventional methods. The case of a rigid-walled, water-filled tube is analyzed theoretically. Results of measurements made by this method in a practical high-pressure calibration chamber are shown. (Author)

AD-630 352 Fld. 20/1, 17/1
NAVY UNDERWATER SOUND REFERENCE LAB ORLANDO FLA
SONAR TRANSDUCER CALIBRATION IN A HIGHPRESSURE TUBE.

Research rept.,
by Louis G. Beatty, Robert J. Bobber, and David L. Phillips. 1 Apr 66, 10p. Rept. no. USRL-RR-83,

Unclassified report

See also AD-630 351.

Availability: Published in The Journal of Acoustical Society of America v39 n1 p48-54 Jan 1966. Copies to DDC users only.

Descriptors: (*Sonar equipment, Calibration), (*Electroacoustic transducers, Calibration), (*Calibration, Sonar equipment), Pressure vessels, Hydrostatic pressure, Deep submergence, Acoustic impedance, Sound transmission

A unique tube facility for the calibration of sonar transducers under hydrostatic pressures to 8500 psi is described. The pressure vessel consists of the modified liner from a 16-in. gun. The liner is 50 ft long and has an inside diameter of 15 in. An activeimpedance principle is applied to establish plane progressive waves within the tube. Resonant transducers can be calibrated in the frequency range 1001500 Hz; nonresonant, hard transducers can be calibrated in the range 40-1500 Hz. (Author)

AD-630 081 **See Fld. 20/10**

AD-630 422 **See Fld. 17/1**

20/2. CRYSTALLOGRAPHY

AD-629 770 Fld. 20/2, 8/7
CFSTI Prices: HC $2.00 MF $0.50
REDSTONE SCIENTIFIC INFORMATION CENTER REDSTONE ARSENAL ALA
SOME FUNDAMENTAL PROBLEMS IN CRYSTAL CHEMISTRY AND THEIR USE IN MINERALOGY,
by A. S. Povarennykh. 25 Jan 66, 49p. Rept. no. RSIC-507,
TT 66-60750

Unclassified report

Trans. of Vsesoyuznoe Mineralogicheskoe Obshchestve. Zapiski (USSR) v84 n4 p470-92 1955.

Descriptors: (*Crystals, Chemistry), (*Minerals, Crystals), Theory, Atomic structure, Chemical bonds, Crystallography, Geometric forms, USSR

Analysis of the three most important problems in crystal chemistry shows that the original representations which are based on a formal-geometric theory of the formation of crystals are insufficient for explaining facts established in the last ten years of the development of this science. An attempt was made to develop more correct representations of the nature of crystal material, based on the energy properties and structure of the electron shells of the atoms. The effect was stressed of their fundamental properties on the chemical bonds between them, on which depend the effective radii and the appearance of directed bonds also. This solution to the considered problems is still rough and incomplete, partly because of the low accuracy of the energy constants for the atoms and the insufficient allowance for their mutual arrangement. Further, the effect of the metallic nature of bonds has not yet been considered, and the study covers only the simplest binary compounds of elements. (Author)

AD-630 259 Fld. 20/2, 7/2
CFSTI Prices: HC $3.60 MF $0.50
LITTON PRECISION PRODUCTS INC MORRIS PLAINS N J AIRTRON DIV
HYDROTHERMAL GROWTH OF CRYSTALS OF LAALO3.
Semiannual technical summary rept. 1 Jul-31 Dec 65.

31 Dec 65, 33p. Contract Nonr-4616 (00), ARPA Order-306-62 Proj. 4730.

Unclassified report

Descriptors: (*Lanthanum compounds, Aluminates), (*Crystal growth, Lanthanum compounds), Doping, Chromium, Single crystals, Absorption spectrum, Solvents, Oxides, Barium compounds, Boron compounds, Mixtures, Optical properties

Large single crystals of pale yellow LaAlO3 (undoped) measuring approximately 1/2 inch x 1/2 inch x 1/4 inch were successfully grown in a 250 ml crucible from a Bi2O3-B2O3 flux. The ratio of B2O3 to Bi2O3 was an important consideration in the composition of the melt; compositions consisting of about 19 m % B2O3 appeared to produce the best growth. Larger B2O3 ratios produced a glassy melt from which no crystals grew while pure Bi2O3 yielded numerous small crystals no larger than 1 cu. mm. Weight gains of up to 36% have been achieved in the hydrothermal system using flux grown seeds. Hydrothermally reacted and sintered LaAlO3 pellets have been tried as nutrient. Also a hot pressed mixture of the component oxides was tried. Neither approach was completely successful, but each method shows some merit. One large autoclave failed due to cracks in the seal area during the report period. It has been rebored, fitted with a liner and water tested successfully. Optical absorption and fluorescence measurements have been made on flux and hydrothermally grown samples of LaAlO3:Cr and on undoped flux grown LaAlO3. The hydrothermally grown samples appear green due to the presence of a transmission band at 5300A. (Author)

AD-629 840 **See Fld. 20/12**

AD-629 850 **See Fld. 11/6**

AD-630 013 **See Fld. 20/12**

AD-630 164 **See Fld. 7/4**

AD-630 345 **See Fld. 20/3**

AD-630 348 **See Fld. 7/4**

AD-630 451 **See Fld. 20/12**

AD-630 457 **See Fld. 7/4**

AD-630 458 **See Fld. 7/4**

20/3. ELECTRICITY AND MAGNETISM

AD-629 858 Fld. 20/3
WAYNE STATE UNIV DETROIT MICH DEPT OF PHYSICS
INVESTIGATIONS OF THE ELECTRONIC STRUCTURES OF METALS USING ULTRASONIC TECHNIQUES,
by Norman Tepley. 28 May 65, 19p. Contract AF-AFOSR-695-64,
AFOSR 66-0079

Unclassified report

Availability: Published in Proceedings of the IEEE v53 n10 p1586-1603 Oct 1965. Copies to DDC users only.

Descriptors: (*Metals, Ultrasonic radiation), Electrons, Superconductivity, Magnetic properties, Transport properties, Attenuation, Resonance, State-of-the-art reviews

The paper reviews ultrasonic research on the electronic properties of metals performed since the first observations, about ten years ago, that at low temperatures electrons are responsible for the primary contribution to the ultrasonic attenuation. After a description of the Fermi surface and other aspects of the physics of electrons in metals, there is a sketch of the origins of geometric resonances, acoustic cyclotron resonances, and quantum oscillations, as well as other less familiar magnetoacoustic effects in the ultrasonic attenuation in pure metals. The types of information that each of these effects can give about the Fermi surface are cited. There is a discussion of ultrasonic attenuation experiments in superconductors, and of the kinds of information that these experiments can provide. In each area, the present status of research is indicated. The paper concludes with a brief description of the experimental techniques involved in this branch of research. Included are some relatively new techniques for performing simultaneous experiments at several ultrasonic frequencies and for performing ultrasonic attenuation experiments in metals at 9 Gc/s. (Author)

AD-629 869 Fld. 20/3, 20/9
CFSTI Prices: HC $4.00 MF $1.00
SPACE SCIENCES INC WALTHAM MASS
INVESTIGATION OF CATHODE PHENOMENA IN THE MERCURY ARC.
Final rept., Jul 64-Aug 65,
by S. B. Afshartous, S. Aisenberg, V. Rohatgi, and C. G. SMmith. Feb 66, 147p. Contract AF 30 (602)-3093, Proj. AF-5573, Task 557303, RADC TR-66-12

Unclassified report

Descriptors: (*Mercury, Glow discharges), (*Glow discharges, Mercury), (*Gas discharges, Mercury), (*Cathodes, Glow discharges), Ionic current, Electric arcs, Discharge tubes, Field emission, Thermionic emission, Plasma physics, Spectroscopy

An experimental and analytical study is made of the emission mechanisms of the mercury arc and it is concluded that the cathode spot temperatures are too low to operate predominately by thermionic emission. Various physical processes to reduce work function are discussed, and shown to be probably not significant. An emission model involving ion microfield emission is proposed and shown to be feasable. The related problem of retrograde arc motion is studied and a model involving plasma growth into large magnetic field regions is proposed. The retrograde arc speed is measured as a function of magnetic field and arc current. The variation of spot size with arc current, magnetic field, and vapor pressure is measured and is compared with a theoretical model based upon low pressure energy balance considerations. Spectrographic measurements show the absence of continuum radiation from the Mo notch cathode and the absence of Mo spectral lines. This suggests that the refractory cathode spot operates at low pressures with little electrode evaporation for the conditions studied. The increase of arc votage with magnetic field was measured and was interpreted as being predominately due to the cathode sheath. (Author)

AD-629 919 Fld. 20/3
CFSTI Prices: HC $2.60 MF $0.50
RAND CORP SANTA MONICA CALIF
INTERACTION ENERGY OF A DIELECTRIC IN AN ELECTROSTATIC FIELD,
by Victor Gilinsky, and Dennis Holliday. Mar 66, 22p. Rept. no. RM-4892-PR,
Contract AF 49 (638)-1700,

Unclassified report

Descriptors: (*Dielectrics, Electrostatic fields), Theory, Spheres, Capacitors, Dielectric properties, Voltage

A straightforward computation of the interaction field energy of a dielectric in a uniform external electrostatic field appears to yield a result different from that given by a general theorem. It is shown here that the discrepancy can be resolved by considering the uniform field of infinite extent to be the limit of a field of finite extent. A recent paper by M. S. Plesset and G. Venezian is discussed (Am. J. Phys. 32:860, (1964)).

AD-630 011 Fld. 20/3, 12/1
CFSTI Prices: HC $3.60 MF $0.50
ILLINOIS UNIV URBANA ANTENNA LAB
AN ALTERNATIE APPROACH TO THE SOLU-

TION OF A CLASS OF WIENER-HOPF AND RELATED PROBLEMS.
Technical rept.,
by R. Mittra, and C. P. Bates. Feb 66, 31p.
Rept. no. 65-21 ,TR-8
Contract AF 19 (628)-3819,NsG-395 Proj. AF-5635, Task 563502,
AFCRL 65-919

Unclassified report

Prepared for presentation at URSI EM Theory Symposium, Delft, Netherlands.

Descriptors: (*Field theory, Waveguides), (*Waveguides, Field theory), Integral equations, Boundary value problems, Propagation, Diffraction

A method is presented for solving a class of radiation and diffraction problems which have conventionally been formulated in terms of the Wiener-Hopf approach. The problem is formulated by representating the fields in terms of a modal expansion. The modal expansion for the field in the open regions is characterized by continuous eigenvalues and for the closed regions the fields are representated in terms of the discrete eigenvectors. Matching of the fields to the boundaries and across the aperture results in an equation which is solved by a technique developed in this article. The technique is an extension of the function-theoretic method necessitated by the field representation in the open regions inherent in the problems. The solutions of an open-ended parallel plate waveguide is used to demonstrate the method. Applications to other geometries are indicated. (Author)

AD-630 079 Fld. 20/3, 12/1
LYMAN LAB OF PHYSICS HARVARD UNIV CAMBRIDGE MASS
CORRELATION FUNCTIONS FOR COHERENT FIELDS,
by U. M. Titulaer, and R. J. Glauber. 28 Jun 65, 9p. Contract AF 49 (638)-1380,
AFOSR 66-0018

Unclassified report

Availability: Published in The Physical Review v140 n3B pB676-82 Nov 8 1965. Copies to DDC users only.

Descriptors: (*Statistical functions, Field theory), (*Field theory, Statistical functions), Coherent scattering, Electromagnetic fields

A factorization condition which must be satisfied by the first n correlation functions for the electromagnetic field operators has been used to define nth-order coherence. The first-order coherence condition has been shown to imply maximum fringe contrast in interference patterns. In the present paper the authors investigate the mathematical consequences of assuming the condition for maximum fringe contrast. By considering the correlation functions as scalar products and formulating rigorous inequalities for them they are able to show that the assumed condition in turn implies factorization of the first-order correlation function. By extending the same methods they are able to show that all of the higher order correlation functions factorize into forms similar to those required for full coherence, but differing from them through the inclusion of a sequence of constant numerical factors. These coefficients are shown to furnish a convenient description of the higher-order coherence properties of the field. Their values are presented for some typical examples. They derive a number of inequalities satisfied by the coefficients for the case of fields which possess positive-definite weight functions in the P representation. Some inequalities obeyed by the correlation functions for such fields are derived as well. (Author)

AD-630 123 Fld. 20/3
CFSTI Prices: HC $1.10 MF $0.50
MINNESOTA UNIV MINNEAPOLIS PLASMA PHYSICS LAB
STUDY OF COLLISION PROCESSES IN GASEOUS PLASMAS.
Semi-annual technical rept. no. 5,
by H. J. Oskam. Jan 66, 8p. Contract Nonr-710 (37)

Unclassified report

See also AD-617 386.

Descriptors: (*Plasma medium, Scientific research), Recombination reactions, Helium, Neon, Line spectrum, Molecular spectroscopy, Glow discharges, Ions

The report summarizes the studies related to collision processes in gaseous plasmas during the period July 1965 to January 1966. During this period the papers, 'Afterglow Studies in Noble Gas-Hydrogen Mixtures,' (J. Appl. Phys. 36, 3740 (1965)) and 'Ion Mobilities in Helium,' (Phys. Rev. Letters 15, 1018 (1965)) were published and two papers ('Afterglow Studies in Helium'; 'A Technique for Simultaneously Measuring Ion Densities, Metastable Atom Densities and Light Emission in Decaying Gaseous Plasmas') were accepted for publication. Three papers were presented at the Eighteenth Gaseous Electronics Conference (October 1965, Minneapolis). Summaries are given of conclusions resulting from studies by means of the SLEAMA I system and the Mobility-Mass Identification Tube. Also discussed are modifications planned for the SLEAMA systems, and miscellaneous results. (Author)

AD-630 341 Fld. 20/3
CFSTI Prices: HC $1.60 MF $0.50
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J
CHEMICALLY DEPOSITED YTTRIUM-IRON-GARNET FILMS.
Technical rept.,
by William Skudera, William Wade, and Thomas Collins. Feb 66, 16p. Rept. no. ECOM-2667, Task DA-1C0-24401-A348,

Unclassified report

Descriptors: (*Films, Garnet), (*Ferromagnetic materials, Films), Yttrium compounds, Iron compounds, Aluminum compounds, Preparation, Thickness, Particle size, Phase studies, Magnetic resonance, Microwave frequency

Thin films of yttrium-iron-garnet and aluminum substituted yttrium-iron-garnet, ranging in thickness from 0.5 to 38 microns, were prepared by chemical deposition techniques. Major phase, firing temperature, linewidth, thickness and particle size studies were made on these films to determine and control single phase formation and to obtain a minimum ferrimagnetic linewidth for potential microwave applications. Experimental results show that the narrowest linewidth, 125 oersteds, was obtained for the film with the highest degree of major phase structure. It was also found that films with submicron as well as micron particle sizes can also be formed. (Author)

AD-630 345 Fld. 20/3, 20/2
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH WRIGHT-PATTERSON AFB OHIO
INTERFACIAL POLARIZATION AND ELECTRICAL CONDUCTIVITY IN SAPPHIRE,
by N. M. Tallan, and H. C. Graham. 21 Dec 64, 9p. Rept. no. ARL-65-262,

Unclassified report

Availability: Published in Journal of the American Ceramic Society v48 n10 p512-6 Oct 1965. Copies to DDC users only.

Descriptors: (*Sapphires, Electrical properties), Aluminum compounds, Oxides, Single crystals, Electrical conductivity, Polarization, Surface properties, Heat of activation, Doping, Dielectric properties, High temperature research

Dielectric relaxation effects, a dissipation factor peak, and both capacitance and conductivity dispersions were observed in pure and doped single crystals of Al2O3 between 100 and 1,000,000 cps and between 700 and 1200 C. The observed peak heights and computed intrinsic relaxation times do not, in general, support a dipole rotation model. The observed behavior is interpreted instead as interfacial polarization in a layered dielectric. The activation energies for conduction computed on the basis of this model were 2.4 plus or minus 0.1 and 1.6 plus or minus 0.2 ev. (Author)

AD-630 376 Fld. 20/3, 20/10
PURDUE UNIV LAFAYETTE IND DEPT OF PHYSICS
TRANSIT ACCELERATION OF CHARGED PARTICLES IN AN INHOMOGENEOUS ELECTROMAGNETIC FIELD.
Revised ed.,
by C. S. Shen. 30 Oct 64, 16p. Contract AF-AFOSR-274-64,
AFOSR 66-0076

Unclassified report

Revision of Manuscript submitted 5 Aug 64.

Availability: Published in The Astrophysical Journal v141 n3 p1091-1104 Apr 1 1965. Copies to DDC users only.

Descriptors: (*Charged particles, Acceleration), (*Field theory, Upper atmosphere), (*Upper atmosphere, Field theory), (*Astrophysics, Field theory), Quantum mechanics, Electromagnetic fields

This paper discusses the transit acceleration of charged particles when they pass through a time varying inhomogeneous magnet field. Detailed calculations are carried out for cases when the varying field is small compared to the homogeneous field. The firstorder effect of the varying field causes diffusion of particles in the phase space. The net energy gain is proportional to the square of the field intensity. When the characteristic frequency of the field is small compared to the cyclotron frequency of the particle, the energy gain of the particle is proportional to the energy of the particle itself. For fast varying fields, the dependence becomes implicit. Unlike the Fermi mechanism, the transit acceleration depends very little on the displacement velocity of the fields. It accelerates electrons more effectively than it does ions. The efficiency of this mechanism is discussed in the last section. The magnetosphere is chosen as the background because of the availability of relatively reliable data obtained from there. It is found that a 10-keV electron may increase its energy to 100 keV within a few hours through the enhanced random-walk process. (Author)

AD-629 824 **See Fld. 20/12**

AD-629 826 **See Fld. 20/12**

AD-629 828 **See Fld. 20/12**

AD-629 889 **See Fld. 9/6**

AD-630 083 **See Fld. 20/12**

AD-630 194 **See Fld. 20/12**

AD-630 372 **See Fld. 20/12**

AD-630 451 **See Fld. 20/12**

AD-630 497 **See Fld. 20/5**

AD-630 503 **See Fld. 20/5**

AD-630 504 **See Fld. 20/5**

20/4. FLUID MECHANICS

AD-629 778 Fld. 20/4
CFSTI Prices: HC $1.60 MF $0.50
POLYTECHNIC INST OF BROOKLYN N Y DEPT OF AEROSPACE ENGINEERING AND APPLIED MECHANICS

THE PLANE LAMINAR JET.
Research rept.,
by Stanley G. Rubin, and Robert Falco. Jan 66, 20p. Rept. no. PIBAL-963,
Contract AF 49 (638)-1623, Proj. AF-9781, Task 978101,
AFOSR 66-0134

Unclassified report

Descriptors: (*Laminar flow, Jets), (*Jets, Laminar flow), Orifices, Momentum, Pressure, Perturbation theory, Asymptotic series

The plane laminar jet emanating from a point orifice is considered. The method of matched asymptotic expansions is used to determine higher-order 'inner' and 'outer' solutions, which are valid at some distance from the orifice. It is shown that the first-order 'inner' solution is non-unique, with respect to a small perturbation, and introduces an arbitrary constant. Higher-order solutions are obtained and the existence of additional arbitrary constants is predicted. It is seen that although axial viscous effects do not appear to second-order, the downstream momentum flux is variable due to a non-uniform pressure distribution. (Author)

AD-629 782 Fld. 20/4, 9/2, 1/3
CFSTI Prices: HC $9.60 MF $0.75
CORNELL AERONAUTICAL LAB INC BUFFALO N Y
THEORETICAL PREDICTION OF THE FLOW IN THE WAKE OF A HELICOPTER ROTOR. PART I. DEVELOPMENT OF THEORY AND RESULTS OF COMPUTATIONS.
Final rept., pt. 1 Sept 64-Sep 65,
by Peter Crimi. Sep 65, 93p. Rept. no. CAL-BB-1994-S-1,
Contract DA-30-069-AMC-645 (R)

Unclassified report

Descriptors: (*Wake, Helicopter rotors), (*Fluid mechanics, Mathematical models), Theory, Potential theory, Numerical analysis, Programming (Computers)

A study was performed with the objective of predicting the time-varying flow in the vicinity of a helicopter in hovering or forward flight. An analytical model was formulated which represents the rotor, its wake and the fuselage of the aircraft. The model for the wake has been simplified in a manner consistent with flow visualization studies by representing the wake as tip vortices emanating from each blade. The wake vortices are assumed to be free to convect under the influence of the blades, the fuselage and the wake itself. The fuselage has been replaced by a surface distribution of sources, the strength per unit area being determined by assuming that the fuselage is subjected to a uniform, steady free stream. A digital computer program was written which implements the model developed. Flow calculations were performed which agree well with measurements of the time average of the flow in the wake of a two-bladed rotor. Extensive calculations were then carried out which define the flow in the vicinity of a UH-1B helicopter for a range of flight conditions from hover to high-speed cruise. Upon analysis of the results, it was concluded that the model developed provides a valid representation of the unsteady flow in the vicinity of a helicopter. It was pointed out that the formulation is somewhat restrictive, in that the flow in the rotor plane and immediately adjacent to the fuselage cannot be accurately predicted. However, the suitable refinements incorporated, these regions could be investigated as well. (Author)

AD-629 783 Fld. 20/4, 9/2
CFSTI Prices: HC $8.60 MF $0.75
CORNELL AERONAUTICAL LAB INC BUFFALO N Y
THEORETICAL PREDICTION OF THE FLOW IN THE WAKE OF A HELICOPTER ROTOR. PART 2. FORMULATION AND APPLICATION OF THE ROTOR-WAKE-FLOW COMPUTER PROGRAM.
Final rept., pt. 2, Sep 64-Sep 65,
by Peter Crimi. Sep 65, 82p. Rept. no. CAL-BB-1994-S-2,
Contract DA-30-069-AMC-645 (R)

Unclassified report

See also AD-629 782.

Descriptors: (*Wake, Helicopter rotors), (*Helicopter rotors, Wake), (*Wake, Programming (Computers)), Digital computers, Hovering, Mathematical models, Flight, Fuselages, Gas flow, Propeller blades, Aerodynamics, Interference

Two digital computer programs were prepared which direct the calculation of the time-varying flow in the vicinity of a helicopter rotor in forward or hovering flight. Fuselage interference effects are taken into account. The applicability of these programs to specific problems and procedures for their use are discussed. First, the assumptions made in constructing the mathematical model and the relationship of the model to the physical flow are outlined. In this connection, the assumptions necessary for numerical analysis and the functional structure of the programs are also given. Then, the formulations which were coded are presented. Included in the formulations are the coordinate identifications used and the definitions of program variables. Finally, the procedures for implementation of the programs are given. The relationship of input quantities to aircraft flight parameters, program accuracy and computer running time are specified. A sample calculation, including both inputs and outputs, is presented. Program listings and operational information related to the programs are given. (Author)

AD-629 827 Fld. 20/4, 20/13
MINNESOTA UNIV MINNEAPOLIS SCHOOL OF PHYSICS
OBSERVATION OF STABLE SUPERFLUID CIRCULATION IN LIQUID-HELIUM II AT THE LEVEL OF ONE, TWO, AND THREE QUANTUM UNITS,
by S. C. Whitmore, and W. Zimmermann Jr., 2 Aug 65, 5p. Contract AF-AFOSR-793-65, AFOSR 65-2772

Unclassified report

Availability: Published in Physical Review Letters v15 n9 p389-92 Aug 30 1965. Copies to DDC users only.

Descriptors: (*Helium, Superfluidity), (*Superfluidity, Quantum mechanics), Liquefied gases, Gas flow

AD-629 885 Fld. 20/4, 13/11
CFSTI Prices: HC $1.00 MF $0.50
IOWA UNIV IOWA CITY INST OF HYDRAULIC RESEARCH
CAVITATION AND ENERGY DISSIPATION IN CONDUIT EXPANSIONS,
by Hunter Rouse, and Vladimir Jezdinsky. 1965, 10p.

Unclassified report

Prepared in cooperation with Ceskoslovenska Akademie Ved, Prague (Czechoslovakia). Prepared for presentation at International Association for Hydraulic Research, Internationl Congress (11th), 1965.

Descriptors: (*Cavitation, Liquid jets), (*Pipes, Hydrodynamics), Turbulence, Diffusion, Pressure, Boundary layer, Czechoslovakia

A laboratory study is described of the onset and development of cavitation in the turbulent eddies produced by the diffusing stream at an abrupt pipe enlargement. Evaluations of incipient cavitation, pressure distribution, head loss, and incipient boundary damage are presented for use in the design of highhead relief conduits. (Author)

AD-629 895 Fld. 20/4
CFSTI Prices: HC $1.10 MF $0.50
OKLAHOMA STATE UNIV STILLWATER SCHOOL OF CIVIL ENGINEERING
FLOW STUDIES PROJECT AT OKLAHOMA STATE UNIVERSITY.
Final rept.,
by E. Rune Lindgren. Nov 65, 10p. Contract Nonr-2595 (05), Proj. SR-009-01-01 Task SR-009-01-103,

Unclassified report

Descriptors: (*Turbulence, Friction), (*Water, Friction), Reduction, Additives, Epoxy plastics, Lubricants, Shear stresses

The investigation concerns the mechanism that causes the observed drastic reduction of turbulent friction in flows of water by the presence of minute amounts of polyethylenoxide and other macromolecular additives.

AD-629 955 Fld. 20/4
CFSTI Prices: HC $6.60 MF $0.75
ARNOLD ENGINEERING DEVELOPMENT CENTER ARNOLD AIR FORCE STATION TENN
MASS TRANSFER AND FIRST-ORDER BOUNDARY -LAYER EFFECTS ON SHARP CONE DRAG,
by Clark H. Lewis, Ernest O. Marchand, and Herber R. Little. Mar 66, 63p. Rept. no. aecd-TR-66-37,
Contract AF 40 (600)-1200, Proj. AF-8953 Task 895303,

Unclassified report

Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Conical bodies, Drag), (*Mass transfer, Drag), (*Drag, Hypersonic flow), (*Hypersonic flow, Conical bodies), Boundary layer, Thermodynamics, Mathematical models, Reynolds number, Injection

A theoretical model is developed based on an iterated perfect gas inviscid-viscous flow field which includes first-order displacement (viscous interaction), transverse curvature, wall slip, and temperature jump in addition to mass transfer effects. The effects of inviscid (tangent cone) and viscous (nonsimilar laminar boundary layer) flow field matching conditions are also considered. The predicted viscous-induced pressure without mass transfer and the zero-lift drag with and without injection were in agreement with the experimental data within experimental uncertainty. The theoretical model was also used to predict zero-lift drag of a 9-deg half-angle cone at Mach = 9.37 and 10 and Reynolds number/in. = 400 to 45,000 for a range of wall-to-stagnation temperature ratios. Again, in general, without mass transfer the predictions were within experimental uncertainty. The inability of the theoretical model to adequately treat nonuniform mass transfer distributions is discussed. At the lowest Reynolds number the effects of slip were most significant. At all conditions the effects of inviscid-viscous flow field matching were significant. Experimental zero injection equilibrium wall temperature distributions and cool-wall pressure data are given. (Author)

AD-630 018 Fld. 20/4
IOWA UNIV IOWA CITY INST OF HYDRAULIC RESEARCH
THE BERNOULLI THEOREM,
by Hunter Rouse. 30 Jun 64, 7p. Rept. no. Reprint-205,
Contract AROD-2871-E, Nonr-1509 (03)

Unclassified report

Japanese abstract by Mikio Arie.

Availability: Published in Journal of the Japan Society of Mechanical Engineers v68 n562 p12-7 Nov 1965. Copies to DDC users only.

Descriptors: (*Theorems, Fluid mechanics),

(*Fluid mechanics, Theorems), Hydrodynamics, Pressure, Equations of motion

AD-630 168 Fld. 20/4, 1/1
CFSTI Prices: HC $1.00 MF $0.50
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
AN INVESTIGATION OF PRESSURE DISTRIBUTION ON CERTAIN STARLIKE BODIES AT NEARLY 4M,
by Alexis Baratoff. 17 Mar 66, 11p. Rept. no. ATD-66-27, TT 66-60764
Unclassified report

Trans. of Prikladnaya Matematika i Mekhanika (USSR) n6 p122-5 1965. Rept. on Surveys of Soviet Scientific and Technical Literature.

Descriptors: (*Aerodynamics, USSR), Aerodynamic configurations, Model tests, Wind tunnels, Supersonic flow, Hypersonic flow, Aerodynamic characteristics, Swept wings, Delta wings

It was theoretically established recently (according to the two Bibliography entries included at the end of the article) that starlike body shapes may become aerodynamically prospective in the sense of reducing drag and increasing the lift/drag ratio at supersonic and hypersonic speeds. The author describes the results of experimental investigations on drainage models. The investigation was carried out in an aerodynamic wind tunnel at M = 3.85 plus or minus 0.1 and Re = 6.0 x 106 (l = 0.2m). The article is divided into two parts. In the first part the author explains measurement techniques and describes the models (three steel models of V-shaped wings). In the second part test results are discussed as well as a comparison with the theory. The author concludes that 'on the basis of experimental data on pressure distribution, it is not difficult to calculate the wave-drag coefficient of starlike bodies. ... the theoretical and experimental data are in good agreement and indicate that in cases predicted by theory the wave drag is reduced several-fold.' (Author)

AD-630 203 Fld. 20/4
CFSTI Prices: HC $1.00 MF $0.50
IOWA UNIV IOWA CITY INST OF HYDRAULIC RESEARCH
THE EFFECT OF THE FREE SURFACE ON THE DRAG OF SUPERCAVITATING AXISYMMETRIC BODIES.
Final rept.,
by Arthur D. Newsham. Dec 65, 25p. Contract Nonr-1509 (05)
Unclassified report

Descriptors: (*Drag, Surface properties), (*Cavitation, Drag), Axially symmetric flow, Conical bodies, Disks, Ellipsoids, Underwater objects, Towing vehicles

The drag force on three supercavitating exisymmetric bodies - a disk, a 90-degree cone and a 2:1 ellipsoid truncated at 25 percent of its length - was investigated for varying values of the cavitation coefficient, Froude number, and submergence. The results are compared with existing experimental data for similar bodies deeply submerged and with a theoretical solution for a disk.

AD-630 244 Fld. 20/4
CFSTI Prices: HC $4.60 MF $0.50
NAVAL ORDNANCE LAB WHITE OAK MD
THE USE OF RATIONAL APPROXIMATIONS IN THE DIRECT CALCULATION OF SUPERSONIC FLOW PAST A BLUNT BODY OF REVOLUTION,
by Andrew H. Van Tuyl. 15 Feb 66, 44p. Rept. no. NOLTR-66-14 ,M-62 Proj. FR-30,
Unclassified report

Descriptors: (*Supersonic flow, Bodies of revolution), (*Blunt bodies, Supersonic flow), (*Approximation (Mathematics), Supersonic flow), Axially symmetric flow, Iterative methods, Spheres, Series, Functions, Shock waves

A method using rational approximations is presented for calculation of the supersonic axially symmetric flow of a perfect gas around a given blunt body. The method involves an iteration of the solution of the inverse problem, and matches the bluntness of the calculated body at the nose with that of the given one. The solution of the inverse problem is carried out using certain Pade fractions formed from the Taylor expansion of the stream function in the neighborhood of the nose of the shock. Rational approximations are obtained for the flow quantities on the body in terms of the arc length measured from the nose. In the present approximations, the computing time on the IBM 7090 is about sixty milliseconds for the solution of the inverse problem, and less than a second for the direct problem. Good agreement with measurements and other calculations is found in the subsonic region when the bluntness of the given body is less than or equal to that of a sphere. Examples indicate that the body should not be much blunter than a sphere in the present approximation if reasonable accuracy is desired near the sonic line. (Author)

AD-630 268 Fld. 20/4, 1/1
CFSTI Prices: HC $12.60 MF $1.00
SYLVANIA ELECTRONIC SYSTEMS-EAST NEEDHAM MASS
OPTIMIZATION OF AERODYNAMIC EQUATIONS.
Final rept.,
by Henry J. Wychorski. Feb 66, 126p. Contract N61339-1495, Proj. AF-7071, NAVTRADEVCEN 1495-1
Unclassified report

Descriptors: (*Flight simulators, Training devices), (*Aerodynamics, Equations), (*Supersonic planes, Aerodynamics), Optimization, Swept wings, Integration, Flight, Performance (Engineering), Mathematical analysis, Digital computers

An evaluation study was conducted on UDOFTT (Universal Digital Flight Trainer Tool) during which a set of complete aerodynamic equations pertaining to a supersonic swept-wing high-performance aircraft was simulated and then optimized. The influence of expanding the integration interval on the flying qualities was also investigated. The study indicated that 12 terms could be eliminated from the flight equations and that the quadrature interval for O33 Mod Gurk could be expanded without adverse influence on the flying qualities of the trainer. One area that was investigated and found to contribute significant influence on both performance and flying qualities was c.g. position variation. Testing was limited to the clean airplane. Some of the terms included in this investigation take on added significance in unusual flight or other conditions and it is suggested that additional analysis be performed where this exists. (Author)

AD-630 270 Fld. 20/4, 7/4
CFSTI Prices: HC $3.60 MF $0.50
ARMY MISSILE COMMAND REDSTONE ARSENAL ALA ARPA DIV
A GENERALIZED ASYMPTOTIC METHOD FOR THE SOLUTION OF REACTING LAMINAR BOUNDARY LAYER FLOWS. PART I. THREE-DIMENSIONAL FLOW OF AIR AT CHEMICAL EQUILIBRIUM NEAR A STAGNATION POINT,
by A. A. Hayday, and D. A. Bowlus. 24 Jan 66, 35p. Rept. no. RN-TR-66-2,
Unclassified report

Descriptors: (*Laminar boundary layer, Threedimensional flow), (*Air, Stagnation point), Chemical equilibrium, Equations of motion, Boundary value problems, Asymptotic series

In this report the asymptotic method is properly generalized and applied to the solution of the laminar boundary layer flow of dissociated air in the vicinity of a stagnation point on a general surface, S. The flow is considered to be in chemical equilibrium and belongs to the similarity class. Geometric considerations are manifested by a parameter c whose range is 0 < or = c < or = 1, the two bounds corresponding respectively to the special cases of two-dimensional and rotationally symmetric flows. Basically, the solution of the example problems consists in solving several coupled nonlinear equations subject to specified boundary conditions (constant wall and stream enthalpy, equilibrium concentration of species at the wall and in the stream) and the choice of a preselected thermochemical model. The main reason for discussing general three-dimensional stagnation point flows, other than their technical importance, is to assess the accuracy of the asymptotic method in computing the flow field, local friction and heat transfer for a class of the 'simpler' problems. The test for c = 1 is provided by the often quoted numerical results of Fay and Riddell. Care has been taken to reproduce their transport properties and their reaction model. (This is the only numerical work required.) In the special case of no reactions and constant properties, the earlier results of the authors, found to be in excellent agreement with the corresponding numerical solutions of Howarth, are recovered. These provide an auxiliary check.

AD-630 286 Fld. 20/4
CFSTI Prices: HC $3.60 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
CAVITATION ON SURFACE IRREGULARITIES OF TRIANGULAR PROFILE,
by K. K. Shalnev. 1 Feb 66, 33p. Rept. no. FTD-TT-65-1606, TT 66-60818
Unclassified report

Unedited rough draft trans. of Zhurnal Prikladnoi Mekhaniki i Tekhnicheskoi Fiziki (USSR) n6 p68-80 1962.

Descriptors: (*Cavitation, Erosion), (*Metal plates, Corrosion), Surfaces, Surface properties, Hydrodynamics, USSR, Velocity

AD-630 287 Fld. 20/4
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
ON THE EFFECT OF INITIAL TURBULENCE ON THE BOUNDARY AND THE LONG RANGE OF SUBMERGED STREAM,
by Yu. A. Shcherbina. 17 Feb 66, 9p. Rept. no. FTD-TT-65-1945, TT 66-60819
Unclassified report

Unedited rough draft trans. of Fiziko-Tekhnicheskii Institut, Moscow. Trudy (USSR) v7 p152-7 1961.

Descriptors: (*Turbulence, Measurement), (*Boundary layer, Turbulence), Jets, USSR, Nozzles

In sharply turbulated streams (to 30%), the basic laws of streams with normal initial turbulence are preserved. Audomodelive velocity takes place along the length of the stream and rectilinearity of the isotachs. When calculating turbulized stream boundaries, it is necessary to consider the increase in pole distance from the cut of the nozzles with a rise in initial turbulence. When calculating range of turbulated streams, it is necessary, together with the change in the value s, to take into attention the increase in turbulence coefficient a with an increase in the intensity of initial turbulence. Experimental data are given of boundaries and long ranges of flat submerged streams, the initial turbulence of which varied from 6 to 30%. Calculation of such flow is possible with the aid of semiempirical theory of turbulent streams at a corresponding selection of semiempirical constants. Given is a change in these constants with an increase in initial turbulence of the stream. (Author)

AD-630 294 Fld. 20/4
CFSTI Prices: HC $2.00 MF $0.50
BROWN ENGINEERING CO INC HUNTSVILLE ALA RESEARCH LABS
A REVIEW OF RESEARCH ON THE INTERACTION OF A JET WITH AN EXTERNAL STREAM.
Technical note,
by C. C. Lee. Mar 66, 30p. Rept. no. TN-R-184,
Contract DA-01-021-AMC-11528 (Z)
Unclassified report

Descriptors: (*Jet mixing flow, Reviews), Equations, Aerodynamics, Jets, Aerodynamic characteristics, Stabilization systems, Lift, Guided missiles, Thrust vector control systems, Secondary injection

A descriptive review is made of recent studies on the interaction of a jet with an external stream. Experimental data and empirical equations for the jet center line were reported. The existence of a pair of vortices in the jet flow was indicated. Further study, in order to determine the strength and location of the vortices either by acquisition of more data or by the development of the theory, is necessary. (Author)

AD-630 295 Fld. 20/4
CFSTI Prices: HC $6.00 MF $1.25
MASSACHUSETTS INST OF TECH CAMBRIDGE ENGINEERING PROJECTS LAB
AN INDEX TO THE TWO-PHASE GAS-LIQUID FLOW LITERATURE. PART III,
by S. William Gouse,Jr.. Jan 66, 262p. Rept. no. DSR-8734-6,
Contract Nonr-1841 (73),
Unclassified report

See also AD-607 180.

Descriptors: (*Two-phase flow, Bibliographies), State-of-the-art reviews, Gas flow, Fluid flow, Indexes

A total of 1,453 separate references on certain types of two-phase gas-liquid flow phenomena were found, verified, listed, and indexed by subject and principal author. This literature survey was carried out as one phase of a continuing program to determine the state of the art in two-phase gas-liquid flow phenomena. This is the terminal report of a program that has seen the publication of two prior indices, totaling 5,235 references on two-phase gas-liquid flow. The problem areas of condensation, cavitation, and atomization have been generally excluded, except through error or when references were of such a basic character as to be generally useful. A frequency of citation analysis was carried out to determine which of the 5,235 references have been most frequently cited. (Author)

AD-630 305 Fld. 20/4
DAVID TAYLOR MODEL BASIN WASHINGTON D C HYDROMECHANICS LAB
THE EXCITING FORCES ON A MOVING BODY IN WAVES.
Final rept.,
by J. N. Newman. Feb 66, 14p. Proj. S-R011-01-01, Task 0401,
DTMB 2159
Unclassified report

Availability: Published in Journal of Ship Research v9 n3 p190-9 Dec 1965. Copies to DDC users only.

Descriptors: (*Hydrodynamic configurations, Fluid dynamic properties), (*Water waves, Force (Mechanics)), Ships, Motion, Ellipsoids, Underwater objects, Incompressible flow, Oscillation

The paper generalizes the 'Haskind relations' for the exciting forces in waves, to include the effects of constant forward speed. The analysis assumes the fluid to be ideal and incompressible, and the disturbance of the free surface to be small. The analytical relations are derived for the exciting forces in regular waves, in terms of the radiation potential associated with the forced harmonic oscillations of the same body in calm water. For this purpose it is sufficient to know the far-field asymptotic form of the radiation potential. The results are applied to the case of a submerged ellipsoid, to give the six exciting forces and moments as functions of the wave length, heading angle, and forward velocity. (Author)

AD-630 329 Fld. 20/4
CFSTI Prices: HC $3.60 MF $0.50
BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD
BASE PRESSURE MEASUREMENTS ON SHARP AND BLUNT 9 DEGREE CONES AT MACH NUMBERS FROM 3.50 TO 9.20.
Memo rept.,
by Neil A. Zarin. Nov 65, 36p. Rept. no. BRL-MR-1709,
Proj. RDT/E-1A222901A201,
Unclassified report

Descriptors: (*Conical bodies, Base pressure), (*Base pressure, Hypersonic flow), Blunt bodies, Supersonic flow, Drag, Correlation techniques, Model tests

Base pressure measurements were made on sharp and hemispherically blunted 9 degree cones at Mach numbers from 3.50 to 9.20. The data obtained are compared to experimental data and to data from semiempirical analyses from other sources. An empirical correlation for the base pressure data is presented. The relative contributions of base and form drag to total drag are compared. (Author)

AD-630 337 Fld. 20/4
CFSTI Prices: HC $4.60 MF $0.50
GENERAL ELECTRIC CO PHILADELPHIA PA MISSILE AND SPACE DIV
LAMINAR INCOMPRESSIBLE LEADING AND TRAILING EDGE FLOWS AND THE NEAR WAKE REAR STAGNATION POINT.
Technical information series,
by S. Weinbaum. Feb 66, 46p. Rept. no. R66SD18,
Contract AF 04 (694)-897,
Unclassified report

Prepared for presentation at the AGARD Specialists' Meeting on Separated Flows, at von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese, Belgium May 10 1966.

Descriptors: (*LAMINAR FLOW, Stagnation point), (*Stagnation point, Wake), Leading edge, Trailing edge, Incompressible flow, Velocity, Two-dimensional flow, Flow separation

The paper investigates the behavior of a viscous incompressible fluid in the vicinity of various two-dimensional separation and stagnation points. Locally valid series solutions to the Navier Stokes vorticity equation are developed to study the pressure-viscous force balance in the neighborhood of the singularity and the transition to the flow region where inertial effects are important. The nature of the singularity is established for an arbitrary symmetric leading or trailing edge and a solution obtained to within an arbitrary constant that depends on the wall shear. The convergence of the series is examined via a term by term comparison with Howarth's exact numerical solution for a two-dimensional stagnation point. The solution for the near wake rear stagnation point shows that the wake cannot close in an arbitrary manner, but that the asymptotic direction of the dividing streamline prior to stagnation is a single valued function of the ratio of the velocity on the dividing streamline to that on the wake centerline. Finally, the leading term of a series solution for a blunt based trailing edge is obtained. Upstream influence is neglected, but the zero slip condition on the rear wall is satisfied, and a non-zero separation angle for the dividing streamline is treated for the first time. (Author)

AD-630 342 Fld. 20/4
CFSTI Prices: HC $3.00 MF $0.75
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
AN ENGINEERING METHOD FOR RAPID CALCULATION OF SUPERSONIC-HYPERSONIC PRESSURE DISTRIBUTIONS ON LIFTING AND NON-LIFTING POINTED BODIES OF REVOLUTION AND SEVERAL SPECIAL CASES OF BLUNT-NOSED BODIES OF REVOLUTION.
Technical memo.,
by R. J. Vendemia,Jr.. Nov 65, 76p. Rept. no. TG-752,
Contract NOw-62-0604-c, Task A31,
Unclassified report

Descriptors: (*Bodies of revolution, Pressure), (*Supersonic characteristics, Pressure), (*Hypersonic characteristics, Pressure), Blunt bodies, Lift, Aerodynamic configurations, Distribution, Numerical methods and procedures, Angle of attack, Afterbodies

The method, which utilized hybrid tandem solutions involving Generalized Newtonian and Shock-Expansion theories, provides accurate results for a variety of nose shapes and fineness ratios over a range of supersonic/hypersonic Mach numbers. The numerical simplicity of the method, which makes it readily applicable for quick hand-calculational procedures, was the prime factor in its selection and publication. The investigation for lifting bodies indicates the present method is applicable for bodies of revolution at angles of attack up to about ten degrees. The report presents numerical examples showing stepwise calculational procedures for obtaining pressure coefficient and local Mach number distributions along the meridians of a body of revolution at angle of attack.

AD-630 353 Fld. 20/4, 13/10
CFSTI Prices: HC $6.60 MF $0.75
SAINT ANTHONY FALLS HYDRAULIC LAB UNIV OF MINNESOTA MINNEAPOLIS
SUPERCAVITATING FLAT-PLATE WITH AN OSCILLATING FLAP AT ZERO CAVITATION NUMBER,
Final rept.,
by C. S. Song. Nov 65, 69p. Rept. no. Technical paper-52-B,
Contract Nonr-710 (24) Proj. NR-062-052,
Unclassified report

Descriptors: (*Cavitation, Hydrofoils), (*Hydrofoils, Cavitation), Frequency, Lift, Drag, Moments, Perturbation theory, Oscillation, Jets, Acceleration, Wind tunnels

The results of experimental and theoretical investigations on a supercavitating flat-plate with an oscillating flap at zero cavitation number are presented. The experiment was carried out in a vertical free-jet water tunnel using 3 in. chord and 2 in. chord flat-plate hydrofoils, both having flap-chord ratios of 0.29. Various relative locations of the free surfaces were used and the reduced frequency range of zero to four was covered. Amplitude and phase angle of lift, drag, and moment as well as the surface wave speed were measured. The problem was also solved analytically by means of a first order perturbation theory using complex acceleration potenital. Numerical values were obtained for the cases of inifinite fluid, symmetrical jet, and zero spray thickness using three flap-chord ratios (0.25, 0.30, 0.40). Fairly good agreement between the experimental data and the analytical results was obtained. (Author)

AD-630 411 Fld. 20/4
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
THICKNESS OF THE TURBULENT MIXING ZONE ON THE BOUNDARY OF TWO STREAMS OF GASES OF DIFFERENT VELOCITY AND DENSITY,

by O. V. Yakovlevskii. 18 Feb 66, 8p. Rept. no. FTD-TT-65-1928, TT 66-60826

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Energetika i Transport, n10 p153-5 1958.

Descriptors: (*Turbulent boundary layer, Thickness), Stability, Gas flow, Density, Velocity, USSR

AD-630 425 Fld. 20/4
CFSTI Prices: HC $8.60 MF $0.75
MASSACHUSETTS INST OF TECH CAMBRIDGE FLUID DYNAMICS RESEARCH LAB
SUPERSONIC STEADY AND UNSTEADY FLOWS OVER SLENDER AXISYMMETRIC BODIES WITH CONTINUOUS OR DISCONTINUOUT SURFACE SLOPES, PART I,
by Jerzy J. Kacprzynski. Dec 65, 90p. Rept. no. Lab-65-3-Pt-1,
Contract AF-AFOSR-156-65,
AFOSR 66-0132

Unclassified report

Descriptors: (*Supersonic flow, Geometric forms), (*Axially symmetric flow, Theory), Mathematical analysis, Slender bodies, Integral transforms, Perturbation theory

The report contains the first part of an investigation aimed at finding methods for calculating steady and unsteady inviscid flows past slender three-dimensional bodies of general shape, with continuous or discontinuous slope, but with continuous cross-sectional area. The method is an extension of an approximation proposed by Lighthill (1948) in which the solution is based on the solution of Laplace transformed potential equation and is expressed by Bessel functions. Several characteristic functions, which lead to combinations of Bessel functions, were introduced and calculated. Considered are cases of axial steady flow and cross-flow past a body with discontinuities in slope, as well as unsteady flows for Mach numbers high enough so that it is possible to assume that B squared = (M squared - 1) nearly equal to M squared. The latter investigation induces flows with general unsteady boundary conditions, the body with a harmonically vibrating surface and the gust entry problem. (Author)

AD-630 450 Fld. 20/4, 14/2, 22/3
CFSTI Prices: HC $3.00 MF $0.75
AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
INVESTIGATIONS IN SOVIET HYPERVELOCITY TESTING TECHNIQUE.
Comprehensive rept. on Surveys of Communist World Scientific and Technical Literature,
by Alexis Baratoff. 16 Dec 65, 85p. Rept. no. ATD-65-114,
TT 66-60831

Unclassified report

Descriptors: (*Hypersonic characteristics, Test methods), (*Plasma physics, Supersonic flow), (*Fluid dynamics, Hypersonic flow), Test facilities, Supersonic wind tunnels, Shock tubes, Shock waves, Gas flow, Boundary layer, Heat transfer, Fluid dynamic properties, High-temperature research, Detonation waves, Reentry vehicles, Mass transfer

This comprehensive report is based on Soviet-Satellite open sources published 1924-1965. It concerns experimental research in high velocity aerodynamics and gas dynamics. The first section lists facilities and personnel engaged in this field of research; it gives data on wind tunnels, shock tubes, and shock tube flows; a third chapter pertains to measurement techniques (velocity, density, temperature, and pressure). The second section deals with such problems of aerophysics as the state of a gas heated by a shock wave and related phenomena taking place behind a shock wave, such as dissociation, ionization, light emission, radiation, and formation of plasma. It includes chapters on shock tube flows, boundary layer interaction, physical properties of gases at high temperatures, heat transfer, mass transfer, and detonation. The research is based on simulation of the conditions encountered in space flights and reentry by creating highspeed, high-temperature ionized gas flows by means of shock waves produced in supersonic wind tunnels, shock tubes, discharge tubes, and by explosions. Emphasis has been placed on supersonic shock tube investigations. The shock wave methods employed in laboratory studies of the physical and physiochemical properties of various gases heated by shock waves at high temperatures, the specific apparatus, and the auxiliary means characteristic of many laboratories are described. (Author)

AD-629 779 See Fld. 14/2

AD-629 805 See Fld. 12/1

AD-629 816 See Fld. 20/10

AD-629 871 See Fld. 20/10

AD-629 873 See Fld. 12/1

AD-629 964 See Fld. 12/1

AD-630 065 See Fld. 14/2

AD-630 068 See Fld. 13/10

AD-630 069 See Fld. 12/1

AD-630 116 See Fld. 8/12

AD-630 174 See Fld. 3/2

AD-630 279 See Fld. 20/10

AD-630 315 See Fld. 14/2

AD-630 326 See Fld. 20/1

AD-630 347 See Fld. 20/13

AD-630 354 See Fld. 13/10

AD-630 400 See Fld. 7/4

AD-630 430 See Fld. 13/10

AD-630 431 See Fld. 8/3

AD-630 468 See Fld. 14/2

AD-630 497 See Fld. 20/5

20/5. MASERS AND LASERS

AD-629 925 Fld. 20/5, 20/9, 20/10
CFSTI Prices: HC $5.00 MF $1.00
ILLINOIS UNIV URBANA GASEOUS ELECTRONICS LAB
SPECTROSCOPIC AND MICROWAVE INVESTIGATION OF LASERING PLASMAS,
by L. A. C. Weaver, and L. Goldstein. Feb 66, 177p. Rept. no. Scientific-4,
Contract AF 19 (628)-3307, Proj. AF-4642, Task 464203,
AFCRL 66-89

Unclassified report

Descriptors: (*Lasers, Helium group gases), Plasma physics, Kinetic theory, Quantum mechanics, Microwave spectroscopy

The relationship between the process of lasering, the electron gas, and the excited state populations of the active medium are studied for the noble gas lasers. Microwave signals are employed to perturb the electron gas, and resultant alteration of laser output is investigated. The effects of lasering upon the microwave propagation constant, noise radiation temperature, discharge current and spectral emission are investigated experimentally in He-Ne gas lasers, and radiative cascade patterns in noble gases are described by an idealized theoretical model.

AD-630 373 Fld. 20/5
LINCOLN LAB MASS INST OF TECH LEXINGTON
SOLUTION REGROWTH OF PLANAR INSB LASER STRUCTURES,
by Ivars Melngailis, and Arthur R. Calawa. 16 Aug 65, 3p. Rept. no. JA-2642,
Contract AF 19 (628)-5167,
ESD TDR-66-39

Unclassified report

Availability: Published in Journal of the Electrochemical Society v113 n1 p58-9 Jan 1966. Copies to DDC users only.

Descriptors: (*Lasers, Diodes (Semiconductor)), (*Indium alloys, Antimony alloys), (*Diodes (Semiconductor), Lasers), Crystal growth, Substrates, Doping, Solutions

A new technique has been developed for growing a thin layer of InSb on an InSb substrate from a saturated In-InSb melt. This type of growth from a solution has been used previously in the fabrication of GaAs and Ge p-n junctions; however, at the lower temperatures required for InSb (about 300 C) certain modifications were made, such as the use of hot liquid stearic acid which covers the InSb substrate and the In-InSb melt during the growth process. By doping the melt suitably, uniform planar InSb n (+)-p junctions were grown on substrate areas of about 2 sq cm. Such InSb junctions have been used in large-volume injection lasers which emit coherent light in a direction normal to the junction plane. (Author)

AD-630 455 Fld. 20/5, 20/6, 7/4
CFSTI Prices: HC $1.10 MF $0.50
KORAD CORP SANTA MONICA CALIF
FREQUENCY LOCKING AND DYE SPECTRAL HOLE-BURNING IN Q-SPOILED LASERS,
by B. H. Soffer, and B. B. McFarland. 1966, 10p.
Contract Nonr-401 (38)

Unclassified report

Prepared in cooperation with ARPA and Dept. of Defense. Prepared for Publication in Applied Physics Letters.

Descriptors: (*Lasers, Photochromism), (*Photochromism, Lasers), (*Dyes, Photochromism), Phthalocyanines, Photochemistry, Optics, Polarization

AD-630 497 Fld. 20/5, 20/3, 20/4
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
BASIC EQUATIONS AND CONSERVATION THEOREMS FOR THE ELECTROSTRICTION PHONON MASER,
by H. A. Haus, and Paul Penfield,Jr.. 26 Jul 65, 5p. Contract DA-36-039-AMC-03200 (E),

Unclassified report

Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering.

Availability: Published in Journal of Applied Physics v36 n12 p3735-9 Dec 1965. Copies to DDC users only.

Descriptors: (*Electrostriction, Masers), (*Masers, Frequency converters), (*Phonons, Masers), Electromagnetic fields, Fluids, Equations of motion, Hydrodynamics, Relativity theory

Brillouin scattering of light by phonons and the phonon maser are usually described in terms of an approximate set of linearized equations. Here a more exact set of equations for a lossless polarizable fluid is given; only relativistic effects are dis-

regarded. When these equations are linearized and higher order terms in the ratio of sound speed to light speed are disregarded, they reduce to the customary set of equations. The more exact equations permit the derivation of the law of conservation of energy with a simple physical interpretation. From these equations the Manley-Rowe relations and other conservation laws also follow relatively easily. (Author)

AD-630 503 Fld. 20/5, 20/3, 20/10
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
PHOTOCURRENT SPECTRUM AND PHOTOELECTRON COUNTS PRODUCED BY A GAS LASER,
by Charles Freed, and Hermann A. Haus. 4 Aug 65, 12p. Contract DA-36-039-AMC-03200 (E)

Unclassified report

Availability: Published in The Physical Review v141 n1 p287-98 Jan 1966. Copies to DDC users only.

Descriptors: (*Lasers, Photoelectric effect), (*Photoelectric effect, Lasers), Photomultipliers, Photocathodes, Photoelectrons, Quantum mechanics, Optics

The anode-current spectrum of a photomultiplier illuminated by light of time-varying intensity is obtained theoretically. The moments of the photoelectron counts under the same conditions are derived. The expressions are evaluated for the case of light emitted from a laser oscillator by using a semiclassical theory of the Van der Pol oscillator. The theoretical predictions are compared with experiments in which the spectrum of the phtomultiplier was observed in the range 0-17 Mc/sec and counts were recorded for counting intervals in the range between 0.000001 and 0.1 sec. The three lowest order factorial moments were evaluated as functions of T and compared with theory. The spectral data are used to predict the counting data and a comparison is made. The signal-to-noise ratio of the two types of experiments is evaluated and found to be comparable. (Author)

AD-630 504 Fld. 20/5, 20/3, 20/10
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
PHOTOELECTRON STATISTICS PRODUCED BY A LASER OPERATING BELOW THE THRESHOLD OF OSCILLATION,
by Charles Freed, and Hermann A. Haus. 19 Nov 65, 4p. Contract DA-36-039-AMC-03200 (E),

Unclassified report

Availability: Published in Physical Review Letters v15 n25 p943-6 Dec 20 1965. Copies to DDC users only.

Descriptors: (*Lasers, Photoelectric effect), (*Photoelectrons, Quantum statistics), Quantum mechanics, Optics

This paper deals with the theory and experimental verification of the probability distribution of photoelectron counts produced by a narrow-band Gaussian light source. In the experiments to be described, photoelectron counts were taken within time intervals both shorter and longer than the inverse bandwidth of the light. (Author)

AD-629 905 See Fld. 9/5

AD-630 191 See Fld. 5/1

AD-630 243 See Fld. 17/2

20/6. OPTICS

AD-629 929 Fld. 20/6
ROCHESTER UNIV N Y DEPT OF PHYSICS AND ASTRONOMY
LIGHT FLUCTUATIONS AS A NEW SPECTROSCOPIC TOOL,
by E. Wolf. 1965, 14p. Contract AF-AFOSR-237-65,
AFOSR 66-0394

Unclassified report

See also AD-612 501.

Availability: Published in Japanese Journal of Applied Physics v4 p1-13 1965. Copies to DDC users only.

Descriptors: (*Light, Theory), (*Spectroscopy, Light), Lasers, Thermal radiation, Photons, Intensity, Correlation techniques, Photoelectric effect, State-of-the-art reviews

Basic concepts relating to the theory of light fluctuations are presented and features which distinguish the fluctuation properties of thermal and laser light are mentioned. A survey is made of new techniques proposed by many authors, for obtaining information about spectra from fluctuation and correlation measurements. In particular, intensity correlation interferometry, photon coincidence methods and pulse counting techniques are reviewed. Current researches relating to the determination of the phase of the second order complex degree of coherence is also discussed. Theoretical methods for obtaining this phase information utilize the analytic properties of coherence functions. Proposed experimental methods make use of the technique of the coherent background and of three point correlation measurements. The notion of spectral correlation function is introduced and it is shown how it is related to higher order coherence functions. The possibility of obtaining some information about spectral correlation from multiple photon coincidence experiments is also mentioned. (Author)

AD-629 984 Fld. 20/6, 20/9, 20/10
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS
ARGON, KRYPTON, AND XENON CONTINUUM LIGHT SOURCES FOR THE VACUUM ULTRAVIOLET.
Instrumentation papers,
by R. E. Huffman, Y. Tanaka, and J. C. Larrabee. 1965, 11p. Rept. no. AFCRL-IP-88,AFCRL-66-15
Proj. AF-8627, Task 862701,

Unclassified report

Availability: Published in Japanese Journal of Applied Physics v4 Suppl-1 1965, Proceedings of the Conference on Photographic and Spectroscopic Optics 1964 p494-500. Copies to DDC users only.

Descriptors: (*Light, Ultraviolet radiation), (*Ultraviolet radiation, Light), (*Lighting equipment, Ultraviolet radiation), (*Gas discharges, Ultraviolet radiation), Argon, Krypton, Xenon, Discharge tubes, Quantum mechanics, Spectroscopy

Argon, krypton, and xenon rare gas continuum light sources have been developed which are suitable for photoelectric scanning in the vacuum ultraviolet. Intense continuum light sources are required for many applications, including study of discrete absorption spectra. The argon, krypton and xenon continua have maximum intensities at about 1270, 1500, and 1650 A respectively. Together with the intense Hopfield helium continuum which we have earlier produced by similar techniques, these continua provide overlapping coverage of the 580-2000 A wavelength region at bandwidths of at least 0.25 A. The continua are excited with a mild condensed discharge which is controlled by a hydrogen thyratron modulator developed for this purpose. A 2.2m normal incidence monochromator equipped with a sodium salicylate-photomultiplier detector was used. Optimum conditions for producing these continua, details of the instrumentation, and typical recorder scans will be discussed. (Author)

AD-630 050 Fld. 20/6
CFSTI Prices: HC $2.60 MF $0.50
MSI ELECTRONICS INC RICHMOND HILL N Y
RESEARCH AND DEVELOPMENT OF A ELECTRO OPTIC WIDEBAND SPECTRUM ANALYZER.
Quarterly rept. no. 1, 16 Nov 65-31 Jan 66. 15 Feb 66, 22p. Contract NObsr-95080, Proj. SR-0080301, Task 9346,

Unclassified report

Descriptors: (*Spectrum analyzers, Design), (*Electrooptics, Spectrum analyzers), Dielectrics, Waveguides, X band, Broadband, Sensitivity, Crystals, Phase detectors, Microwave spectroscopy

Test equipment is being assembled to perform a single -frequency detection experiment. Preliminary tests at RF show that a dielectric structure will match the electro -optic crystal into X-Band waveguide, and various artificial dielectrics are being tested for use in this design. An optical discriminator is being made, together with its photodetector, to integrate with the waveguide electro -optical portion of the spectrum analyzer. Analysis of the optical discriminator system shows good broadband performance with sensitivity falling off only 5% at each extreme of the 8 to 12 G band. (Author)

AD-630 184 Fld. 20/6, 20/12
COLUMBIA UNIV NEW YORK DEPT OF ELECTRICAL ENGINEERING
EFFECT OF CHARGED SURFACES ON THE OPTICAL ABSORPTION EDGE.
Technical rept.,
by David Redfield. 28 Jul 65, 8p. Rept. no. cu-1-66-NONR4259 (16)-EE,TR-90
Contract Nonr-4259 (16) Proj. NR-017-465,

Unclassified report

Availability: Published in The Physical Review v140 n4A pA2056-8 13 Dec 65. Copies to DDC users only.

Descriptors: (*Semiconductors, Absorption spectrum), (*Absorption spectrum,Surface properties), Electric fields, Space charges, Band theory of solids, Photons, Frequency

Electric fields existing within the space-charge region near a charged surface of a solid are shown to be capable of significantly altering the fundamental optical absorption edge. Their effect is to produce below the gap energy an exponential tail whose slope and magnitude depend on the field strengths. Furthermore, at any given frequency in this tail, an apparent absorption coefficient should be observed having an inverse dependence on the sample thickness. Using representative values for the relevant quantities, it is found that this effect can produce an apparent absorption coefficient of 200/cm at the photon energy equal to the energy gap with the tail extending below this for approx. 0.02 eV. Some data are cited to support the suggestion that such absorption effects occur very commonly although they have not been recognized. (Author)

AD-630 216 Fld. 20/6, 13/1, 7/4
WINDSOR UNIV (ONTARIO) DEPT OF PHYSICS
LIGHT SOURCES FOR THE EXCITATION OF ATOMIC RESONANCE FLUORESCENCE IN POTASSIUM AND RUBIDIUM,
by R. J. Atkinson, G. D. Chapman, and L. Krause. 22 Apr 65, 8p. Contract AF-AFOSR-361-63, AFOSR 66-0384

Unclassified report

Availability: Published in Journal of The Optical Society of America v55 n10 p1269-74 Oct 1965. Copies to DDC users only.

Descriptors: (*Lighting equipment, Radiofre-

quency), (*Fluorescence, Excitation), (*Potassium, Fluorescence), (*Rubidium, Fluorescence), Nuclear resonance, Excitation, Intensity, Line spectrum, Hyperfine structure, Canada

A description is given of radio frequency light sources which produce potassium and rubidium resonance radiation of high intensity. The properties of the spectral lamps have been systematically investigated in relation to their operating parameters. The rf lamps emit resonance lines of much higher peak intensities, smaller halfwidths and smaller degrees of self-reversal than do commercially available lamps. Typical half widths of the resonance lines of potassium and rubidium produced by the rf sources were found to be 0.15/cm and 0.37/cm, respectively, compared with the corresponding widths of 0.34/cm and 1.5/cm, respectively, emitted by Osram spectral lamps operated at low currents. (Author)

AD-630 263 Fld. 20/6, 3/2
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
FIRST TESTS OF A UNIQUE OPTICAL TELESCOPE.
1 Feb 66, 5p. Rept. no. ftd-TT-65-1680,
Unclassified report

Unedited rough draft trans. from Pravda Ukrainy (USSR) 16 Jun p1 1964.

Descriptors: (*Telescopes, Optical equipment), Underground structures, Astronomical observatories, Astrophysics, Molecular spectroscopy, Absorption spectrum, USSR

The testing of a unique optical telescope 96.7 meters long and 400 millimeters in diameter, which is located in an underground tunnel, has been completed at the Main Astronomical Observatory of the Academy of Sciences of the USSR. Placed on 18 reinforced concrete foundations and cemented in over half its diameter, this telescope now allows astrophysicists to study molecular absorption spectra, which is important for spectral investigation of the atmosphere of Venus, Mars and other planets. (Author)

AD-630 470 Fld. 20/6, 3/2, 14/2
CFSTI Prices: HC $3.00 MF $0.50
AIR FORCE FLIGHT DYNAMICS LAB WRIGHT-PATTERSON AFB OHIO
SOLAR SIMULATION IN THE VACUUM AND EXTREME ULTRAVIOLET.
Technical rept.,
by Vernon L. Mangold. Jan 66, 51p. Rept. no. AFFDL-TR-65-189,
Proj. 1309,
Unclassified report

Descriptors: (*Solar radiation, Simulation), (*Ultraviolet radiation, Solar radiation), Lighting equipment, Gas discharges, Light, Ultraviolet detectors, Space simulation chambers, Optics

Solar radiation in the wavelength region of 2000 angstroms down to 500 angstroms consists of two spectral ranges: (1) 2000 to 1600 angstroms wavelength range consists of a continuum characterized by the 4500K black body radiation curve; (2) 1600 to 500 angstroms wavelength range consists of lines and a blend of lines spectra particularized by the spectral line of Lyman Alpha (1215.7A). Sources for simulating and detectors for detecting the solar ultraviolet radiation in the wavelength range of interest are described in some detail. Source operating parameters and detector calibration techniques have been developed and are readily adaptable for solar simulation in the wavelength range of 2000 to 500 angstroms. (Author)

AD-630 506 Fld. 20/6
CFSTI Prices: HC $2.60 MF $0.50
COURANT INST OF MATHEMATICAL SCIENCES NEW YORK UNIV N Y
ENERGY IDENTITIES FOR THE WAVE EQUATION.
Technical rept.,
by Cathleen S. Morawetz. Jan 66, 28p. Rept. no. IMM-NYU-346,
Contract DA-31-124-ARO (D)-365, Proj. DA-20014501B14C,
Unclassified report

Descriptors: (*Optics, *Equations of motion), Identities, Energy, Boundary value problems, Differential geometry

AD-629 843 **See Fld. 11/6**

AD-630 014 **See Fld. 9/2**

AD-630 065 **See Fld. 14/2**

AD-630 117 **See Fld. 4/1**

AD-630 243 **See Fld. 17/2**

AD-630 316 **See Fld. 6/16**

AD-630 366 **See Fld. 14/2**

AD-630 370 **See Fld. 7/4**

AD-630 408 **See Fld. 14/2**

AD-630 452 **See Fld. 20/12**

AD-630 455 **See Fld. 20/5**

AD-630 495 **See Fld. 7/4**

20/7. PARTICLE ACCELERATORS

AD-629 800 **See Fld. 20/9**

20/8. PARTICLE PHYSICS

AD-629 815 Fld. 20/8, 20/10
IMPERIAL COLL OF SCIENCE AND TECHNOLOGY LONDON (ENGLAND) DEPT OF MATHEMATICS
TWO INEQUALITIES FOR CLASSICAL AND QUANTUM SYSTEMS OF PARTICLES WITH HARD CORES,
by O. Penrose. 27 Jun 64, 3p. Contract AF-AFOSR-508 64,
AFOSR 65-2777
Unclassified report

Availability: Published in Physical Letters v11 n3 p224-6 1 Aug 1964. Copies to DDC users only.

Descriptors: (*Inequalities, Quantum mechanics), (*Elementary particles, Quantum mechanics), Wave functions, Great Britain

AD-629 853 Fld. 20/8
ENRICO FERMI INST FOR NUCLEAR STUDIES UNIV OF CHICAGO ILL
POSSIBLE EXISTENCE OF A PI-HE3 RESONANCE WITH Q=11 MEV PRODUCED IN LAMBDAHE4 DECAY,
by M. J. Beniston, B. Krishnamurthy, R. Levi Setti, and M. Raymund. 13 Aug 64, 3p. Contract AF-AFOSR-556-64,
AFOSR 65-0827
Unclassified report

Prepared in cooperation with Chicago Univ., Ill. Dept. of Physics.

Availability: Published in Physical Review Letters v13 n18 p553-5 Nov 2 1964. Copies to DDC users only.

Descriptors: (*Helium, Nuclear reactions), Pions, Lithium, Meson reactions, Protons

An effect in the pi (=-energy histogram from lambda He4 decays in nuclear emulsions has been observed, and is best interpreted as evidence for an excited state of Li4, (10.62 plus or minus 0.20) MeV above decay to proton and He3. The width observed is (0.23 plus or minus 0.20) MeV, which agrees with the pion energy resolution (about 0.40 MeV) in nuclear emulsions only if the upper limit (0.43 MeV) is taken. The narrow resonance width at this excitation energy could be understood in terms of an l = 2 state of Li4, whose p-He3 decay would be forbidden by isospin conservation. (Author)

AD-629 868 Fld. 20/8
ILLINOIS UNIV URBANA DEPT OF MINING METALLURGICAL AND PETROLEUM ENGINEERING
NUCLEAR MAGNETIC RESONANCE IN LIQUID COPPER AND ANTIMONY METALS.
Technical notes (Revised ed.),
by R. L. Odle, and C. P. Flynn. 20 May 65, 5p.
Contract AT (11-1)-1198 ,AF-AFOSR-633-64
AFOSR 65-2594
Unclassified report

Revision of manuscript submitted 15 Mar 65. Prepared in cooperation with Illinois Univ., Urbana. Dept. of Physics.

Availability: Published in The Journal of Physics and Chemistry of Solids v26 p1685-7 1965. Copies to DDC users only.

Descriptors: (*Copper, Nuclear magnetic resonance), (*Antimony, Nuclear magnetic resonance), (*Nuclear magnetic resonance, Liquid metals), Magnetic properties, Atomic energy levels, Electron transitions, Temperature

The Cu63 resonance in solid copper was observed to narrow in the neighborhood of 650C. The line width was not limited by the excessive field inhomogeneity and was found to narrow to an eventual width of 0.3 plus or minus 0.1G. The width to be anticipated if the low temperature result, T sub 1 T = 1.27 sec K may be extrapolated to 1350K is 0.18G. The value of 0.37G obtained from the Korringa relationship and the observed Knight shift is in somewhat better accord with experiment. The Knight shift of solid copper increased by 5 plus or minus 1.5% on heating from room temperature to the melting point. The nuclear resonance of Sb121 in liquid antimony was observed at T>630C. The line is a Lorentzian of width 2.6 plus or minus 0.5 gauss and the Knight shift of 0.72% is close to the values 0.79% and 0.72% found in the neighboring liquid metals indium and tin. The measured line width is reasonably close to the value of 1.9G obtained from the Knight shift and the Korringa relation.

AD-629 975 Fld. 20/8
DUKE UNIV DURHAM N C DEPT OF PHYSICS
THERMAL CONDUCTIVITY IN SOLID HE3 AND HE4,
by B. Bertman, Henry A. Fairbank, Clark W. White, and Michael J. Crooks. 14 Sep 65, 6p.
Contract DA-ARO (D)-31-124-G374,
AROD 3824:3
Unclassified report

Prepared in cooperation with Yale Univ., New Haven, Conn. Dept. of Physics.

Availability: Published in The Physical Review v142 n1 p74-9 Feb 4 1966. Copies to DDC users only.

Descriptors: (*Thermal conductivity, Helium), (*Helium, Solidified gases), Cryogenics, Solid state physics, Heat transfer, Transport properties, Phonons, Scattering, Crystal lattice defects, Dielectrics

The thermal conductivity of solid He (4) and He (3) has been measured over the temperature range

0.5 to 2.0K at a number of molar volumes. In the hcp phase the thermal conductivities of both isotopes show the usual low-temperature maximum. Below the maximum the conductivity is characteristic of boundary scattering with a T3 dependence and a phonon mean free path comparable to the sample diameter. The conductivity above the maximum varies exponentially with 1/T over about three orders of magnitude. This is characteristic of umklapp scattering. In the bcc phase of He3 the anomalous behavior found by Walker and Fairbank is confirmed and the extension of the measurements to lower temperature permits observation of more of the anomalous region. The thermal conductivity in the bcc phase of He4 has also been measured. (Author)

AD-630 032 Fld. 20/8, 18/8
CFSTI Prices: HC $1.60 MF $0.50
ILLINOIS UNIV URBANA
(P,N) REACTION ON ZR91 FOLLOWED BY PROTON EMISSION,
by A. I. Yavin, R. A. Hoffswell, and T. M. Noweir. 1966, 13p.

Unclassified report

Supported in part by the U. S. Office of Naval Research.

Descriptors: (*Proton reactions, Zirconium), (*Zirconium, Proton reactions), (*Radioactive decay, Zirconium), Niobium, Nuclear energy levels, Nuclear spectroscopy, Isotopes, Decay schemes

The reaction Zr91 (p,n) Nb91, where Nb91 denotes the isobaric analogue of the ground state of Zr91, was investigated by observing the proton decay of Nb91. Proton spectra corresponding to 13.0, 13.15, and 13.3 MeV incident proton energies were recorded. The three spectra were then added in order to accentuate any proton group with energy largely independent of the incident proton energy. This procedure broadened extensively all proton peaks with the exception of one. It is strongly suggested that this peak results from the proton decay of Nb91 to the ground state of Zr90. The observed energy release in this decay was 4.70 plus or minus 0.10 MeV. The Coulomb displacement energy is therefore 11.90 plus or minus 0.10 MeV. The observed integrated cross section for the Zr91 (p,n) Nb91 reaction, assuming isotropic decay for Nb91, was approximately 5 mb. As expected, no such effect was observed when Zr90 was used as a target. (Author)

AD-630 042 Fld. 20/8
CFSTI Prices: HC $1.00 MF $0.50
STANFORD UNIV CALIF DEPT OF PHYSICS
THRESHOLD EFFECTS IN NUCLEAR REACTIONS.
Final rept. 1 Nov 62-31 Jan 66,
by Walter E. Meyerhof. 31 Jan 66, 9p. Contract DA-ARO (D)-31-124-G337, Proj. AROD-3269-P ,DA-009925001
AROD 3269:27

Unclassified report

Descriptors: (*Nuclear reactions, Scientific research), Nuclear scattering, Nuclear cross sections, Neutron capture, Polarization, Nuclear spins, Parity, Nuclear energy

The main lines of research, which are described briefly are as follows: Threshold effects in nuclear reactions, nuclear capture reactions, polarization effects in nuclear reactions, role of isotopic spin in nuclear interactions, and properties of excited states in light nuclei (energy, spin and parity, isotopic spin, lifetime).

AD-630 048 Fld. 20/8
CFSTI Prices: HC $1.60 MF $0.50
ILLINOIS UNIV URBANA
(HE3,T) INVESTIGATIONS OF IRON, NICKEL, AND ZIRCONIUM,
by A. I. Yavin, R. A. Hoffswell, L. H. Jones, and T. M. Noweir. 1966, 15p. Contract Nonr-1834 (05)

Unclassified report

Descriptors: (*Nuclear spectroscopy, Tritons), (*Iron, Nuclear spectroscopy), (*Nickel, Nuclear spectroscopy), (*Zirconium, Nuclear spectroscopy), Tritium, Ground state, Nuclear energy levels, Isotopes, Deuterons

Spectra of tritons from the bombardment of Fe (54,56,57), Ni (58,60,61,62,64) and Zr (90,91,92,94) with 18 MeV He3 (2+) ions have been recorded at a laboratory scattering angle of 40 degrees. A pronounced triton peak, corresponding to the excitation of the isobaric analogue of the ground state of the target nucleus, was observed in each spectrum. The observed energy of this triton group was approximately constant for each isotope of the elements investigated. Observed Coulomb displacement energies for Fe and Ni are in reasonable agreement with those measured by Anderson, Wong, and McClure. (Phys. Rev. 138:B615, (1965)). A few other resolvable triton peaks corresponding to excited analogue states as well as to low lying nonanalogue states in the residual nuclei were also observed. (Author)

AD-630 080 Fld. 20/8
HARVARD UNIV CAMBRIDGE MASS
STRONG AND ELECTROMAGNETIC DECAY OF MESONS,
by Lai-Him Chan. 22 Jul 65, 6p. Contract AF 49 (638)-1380,
AFOSR 66-0476

Unclassified report

Availability: Published in The Physical Review v140 n5B pB1324-7 Dec 6 1965. Copies to DDC users only.

Descriptors: (*Meson reactions, Field theory), Pions, Radioactive decay, Photons, Kinetic energy

Partial widths of strong and electromagnetic decays of mesons are calculated within the framework of Schwinger's field theory of matter. Results are consistent with present experimental data. The model requires a two-photon-pseudoscalar-meson interaction and a direct four-pseudoscalar-meson interaction. The former is shown to be consistent with the pion to gamma-positron -electron form factor. The latter explains the delta to eta, pion, pion and eta to positive-, neutral-, negative-pion decays, and the coupling constant also agrees with the pion, pion S-wave coupling constant. Some ustification in terms of the heavy scalar-meson nonet is given for the four-meson interaction. (Author)

AD-630 084 Fld. 20/8
STANFORD UNIV CALIF DEPT OF PHYSICS
TRANSMISSION OF 8 AND 15 MEV NEUTRONS THROUGH ORIENTED 165HO,
by E. G. Shelley, T. R. Fisher, R. S. Safrata, J. McCarthy, and S. M. Austin. 25 Nov 65, 3p. Contract DA-ARO (D)-31-124-G337, AROD 3269:20

Unclassified report

Availability: Published in Physics Letters v19 n8 p684-6 Jan 1 1966. Copies to DDC users only.

Descriptors: (*Holmium, Neutron cross sections), (*Neutron cross sections, Holmium), Neutrons, Energy, Nuclear properties

The effect of nuclear orientation on the neutron total cross section of Ho165 was measured at neutron energies at 8 and 15 MeV. The result is in reasonable agreement with the theoretical prediction of a coupled channel calculation. (Author)

AD-630 087 Fld. 20/8
INSTITUTE OF THEORETICAL PHYSICS STANFORD UNIV CALIF
COUPLING CONSTANTS IN MUON CAPTURE,
by J. D. Walecka, and L. L. Foldy. 19 Jul 65, 14p. Contract AF 49 (638)-1389, AFOSR 66-0452

Unclassified report

Prepared in cooperation with Case Inst. of Tech., Cleveland, Ohio. Dept. of Physics. Contract AT (11-1)-720.

Availability: Published in The Physical Review v140 n5B pB1339-50 6 Dec 1965. Copies to DDC users only.

Descriptors: (*Muons, Meson capture), (*Meson capture, Carbon), Boron, Nuclear energy levels, Vector analysis, Tensor analysis, Electrons, Inelastic scattering, Beta decay, Magnetic moments

The measured capture rate of muons in C12 leading to the ground state of B12, in combination with other data, is employed as a basis for a determination of the weakinteraction coupling constants associated with muon capture. The study of this transition has the advantages: (1) that the rate depends only weakly on the vector, induced pseudoscalar, and (possible) tensor coupling constants, but not at all on a possible scalar coupling constant; (2) that empirical information from inelastic electron scattering on C12 leading to the excitation of the 15.1-MeV level, the M1 lifetime of this level, and the f-tau 1/2 value for the beta decay of B12 allows one to determine the required nuclear matrix elements of major importance (as well as some of minor importance) in practically a modelindependent way. The capture rate can thus be expressed in terms of the axial vector coupling constant and the weak-magnetism coupling constants. (Author)

AD-630 088 Fld. 20/8, 20/10
INSTITUTE OF THEORETICAL PHYSICS STANFORD UNIV CALIF
MODEL OF C VIOLATION IN SEMISTRONG INTERACTIONS,
by Y. Fujii. 21 Jul 65, 11p. Contract AF 49 (638)-1389,
AFOSR 66-0484

Unclassified report

Availability: Published in The Physical Review v140 n5B pB1378-86 Dec 6 1965. Copies to DDC users only.

Descriptors: (*Meson reactions, Transformations), (*Hyperons, Nuclear reactions), K mesons, Pions, Gamma rays, Sigma hyperons, Lambda hyperons, Positrons, Electrons, Annihilation reactions

A simple model of C violation in semistrong interactions is proposed. The basic semistrong interaction is an 'equal' mixture of C-invariant and -noninvariant parts. The former part is the coupling between two neutral vector mesons (Sakurai's interaction), and the latter is the coupling between neutral vector and scalar mesons. The nature of this particular interaction and the possible experimental consequences are discussed. The small K2-neutral to 2 pion decay rate can be consistent with our model. Also the rho meson, gamma, pion coupling and the C-violating effect in the sigmaneutral to lambda-neutral, positron, electron decay are calculated. (Author)

AD-630 138 Fld. 20/8, 20/10
IMPERIAL COLL OF SCIENCE AND TECHNOLOGY LONDON (ENGLAND) DEPT OF PHYSICS
VECTOR MESONS AND COMPLEX ANGULAR MOMENTUM - II,
by K. Ahmed, and M. Martinis. 3 Apr 65, 8p. Contract AF-EOAR-46-64, AFOSR 66-0103

Unclassified report

See also AD-626 342.

Availability: Published in Il Nuovo Cimento series10 v39 p246-51 Sep 1 1965. Copies to DDC users only.

Descriptors: (*Pions, Meson reactions), (*Meson reactions, Momentum), Wave functions, Particle trajectories, Moments, Iterative methods, Field theory, Complex variables

It is shown that the leading singularities in the complex angular momentum plane for the process positive-pion, negative-pion to positive-pion, negative-pion mediated by the vector mesons occur near l = 1. Only sixth-order Feynman graphs are considered. It is found that the analytic part of the sixth-order continued partial-wave amplitude has a purely imaginary contribution near l = 1. Singular part of the amplitude when iterated, gives two Regge poles in the neighbourhood of l = 1. (Author)

AD-630 180 Fld. 20/8
GENERAL ATOMIC SAN DIEGO CALIF
ELECTRODISINTEGRATION OF NUCLEI BY POSITRONS AND ELECTRONS,
by D. F. Herring, I. C. Nascimento, R. B. Walton, and R. E. Sund. 25 Mar 65, 5p. Contract Nonr-4024 (00),

Unclassified report

Availability: Published in Physical Review v139 n3B pB562-6 Aug 9 1965. Copies to DDC users only.

Descriptors: (*Nuclei, Photonuclear reactions), (*Positrons, Photonuclear reactions), (*Electrons, Photonuclear reactions), (*Photonuclear reactions, Probability), Carbon, Copper, Silver, Tantalum, Electron bombardment, Nuclear resonance, Foils, Field theory, Wave functions, Photons

The ratio of the cross sections for electrodisintegration of nuclei by electrons and positrons was measured at 27 MeV for target nuclei of 12C, 63Cu, 107Ag, and 181Ta. For 12C and 107Ag the ratio was measured as a function of energy in the region of the giant resonance. The ratio was determined from activities induced in thin foils which were bombarded by electrons and positrons from an electron linear accelerator. The measured ratio appears to vary linearly with Z and to be independent of energy in the range covered. The results may be used to estimate the extent to which the plane-wave theory of electrodisintegration fails because of the Coulomb distortion of the electron wave function. (Author)

AD-630 220 Fld. 20/8
FLORIDA STATE UNIV TALLAHASSEE DEPT OF PHYSICS
STATISTICAL MODEL AND FLUCTUATION STUDIES OF THE A127 (D,ALPHA)MG25 REACTION IN THE ENERGY RANGE 5.50-8.0 MEV,
by I. M. Naqib, R. Gleyvod, and N. P. Heydenburg. 3 Nov 64, 18p. Contract AF-AFOSR-440-65,
AFOSR 66-0485

Unclassified report

Availability: Published in Nuclear Physics v66 n1 p129-43 1965. Copies to DDC users only.

Descriptors: (*Aluminum, Deuteron bombardment), (*Deuteron reactions, Mathematical models), (*Alpha spectra, Deuteron reactions), Magnesium, Radioactive decay, Energy, Nuclear models, Excitation, Silicon, Nuclear energy levels

Angular distributions for seven outgoing alpha groups were measured at the deuteron energies 5.6, 5.9, 6.2, 6.5, 6.8, 7.4 and 8.0 MeV. Two excitation functions were measured at 80 and 160 degrees, in 40 keV steps, in the energy range 5.46-6.70 MeV. The energy spread of the incoming deuterons was less than 10 keV. By averaging the angular distribution measurements over different outgoing channels and bombarding energies, agreement with the compound nuclear statistical model is obtained. Analysis of the fluctuations in the excitation functions gives qualitative support to the assumption of predominant compound nuclear mechanism in the reaction. The coherence energy is estimated to be 58 plus or minus 8 keV for excitation energies between 23 and 24 MeV of the Si29 compound nucleus. (Author)

AD-630 225 Fld. 20/8, 20/10
MARYLAND UNIV COLLEGE PARK DEPT OF PHYSICS AND ASTRONOMY
BROKEN SYMMETRIES AND MASS FORMULAE FOR VECTOR MESONS,
by G. Segre, and J. Sucher. 8 Jan 65, 12p. Contract AF-AFOSR-500-64,
AFOSR 66-0439

Unclassified report

Availability: Published in Il Nuovo Cimento Series 10 v38 p428-37 Jul 10 1965. Copies to DDC users only.

Descriptors: (*Field theory, Mesons), (*Mesons, Field theory), Model theory, Quantum mechanics

The question of which kind of mass formulae (mass) (2) vs. (mass) (-2)) are correct for a multiplet of vector mesons is studied. It is shown that from a fieldtheoretic point of view, one does not have a clear a priori preference for either kind of formulae. (Author)

AD-630 237 Fld. 20/8
CALIFORNIA UNIV BERKELEY DEPT OF PHYSICS
UNSTABLE-PARTICLE SCATTERING AND THE STRIP APPROXIMATION,
by Ian T. Drummond. 28 May 65, 20p. Contract AF-AFOSR-232-64,
AFOSR 66-0025

Unclassified report

Availability: Published in The Physical Review v140 n2B pB482-99 Oct 25 1965. Copies to DDC users only.

Descriptors: (*Inelastic scattering, Elementary particles), N-body problem, Model theory, Approximation (Mathematics), S-matrix

The author examines, in this paper, the problem of formulating a bootstrap calculation when one of the scattering particles is unstable. Having defined the unstable-particle scattering amplitude as an S-matrix pole residue, he discusses its analytic structure and point out that it may be determined from the usual Landau rules. He concludes that although the instability of the external particle complicates the structure it does not do so too severely. Therefore, he is free to postulate that, in analogy with the stable case, the unstable-particle amplitude exhibits Regge asymptotic behavior. This assumption leads one to construct a strip approximation to the amplitude which is a crossing-symmetric superposition of Regge pole terms. He points out that this approximation exhibits, in some respects, satisfactory analytic structure. In particular it takes quite well into account certain anomalous threshold effects. It satisfies a quasi-Mandelstam representation which is used to explore the analytic structure of the corresponding partial-wave amplitudes and their continuation to arbitrary angular momentum. He uses certain simple discontinuity formulas to obtain dynamical equations for the partial-wave amplitudes and are consequently able to construct, formally, a complete bootstrap scheme. Finally, he mentions some difficulties and unsolved problems. (Author)

AD-630 238 Fld. 20/8
FLORIDA STATE UNIV TALLAHASSEE DEPT OF PHYSICS
EXCHANGE EFFECTS IN THE LI6 (HE3,P)BE8 REACTION,
by N. R. Fletcher, J. D. Marshall, and R. H. Davis. 2 Mar 65, 11p. Contract AF-AFOSR-440-65 ,NSF-GP-671
AFOSR 66-0483

Unclassified report

Availability: Published in Nuclear Physcis v70 p471-9 1965. Copies to DDC users only.

Descriptors: (*Lithium, Particle beams), (*Helium, Nuclear reactions), (*Nuclear reactions, Helium), (*Particle spectra, Protons), Beryllium, Nuclear resonance, Field theory, Nuclear energy levels, Probability, Approximation (Mathematics)

The Li6 (He3,p)Be8 reaction was studied in the bombarding energy range 5 to 17 MeV. No compound nucleus resonances are apparent in the excitation curves. The angular distributions of protons leaving Be8 in the ground state show a gradual change from a dominant back angle maximum at 5 MeV to a dominant forward maximum at 17 MeV. They are described well by the plane wave Born approximation with Exchange (PWBAE) and above 7 MeV the energy dependence of the ratio of cross sections at 0 and 180 degrees can be explained by the kinematics of the two-mode stripping process. Single-mode DWBA calculations do not fit the data at angles beyond the forward maxima. (Author)

AD-630 240 Fld. 20/8
FLORIDA STATE UNIV TALLAHASSEE DEPT OF PHYSICS
REACTIONS INVOLVING SIMPLE ISOBARIC ANALOGUE RESONANCES,
by D. Robson, J. D. Fox, P. Richard, and C. F. Moore. 10 Jul 65, 5p. Contract AF-AFOSR-440-65,
AFOSR 66-0105

Unclassified report

Availability: Published in Physics Letters v18 n1 p86-8 Aug 1 1965. Copies to DDC users only.

Descriptors: (*Resonance, Nuclear reactions), (*Nuclear reactions, Resonance), Nuclear spins, Elastic scattering, Matrix algebra

AD-630 241 Fld. 20/8
PITTSBURGH UNIV PA DEPT OF PHYSICS
ANALYSIS OF SINGLE EXCITATIONS IN INELASTIC DEUTERON SCATTERING FROM NI60, ZR92, AND SN120 NUCLEI.
Revised ed.,
by R. K. Jolly. 22 Mar 65, 15p. Contract AF-AFOSR-440-65 ,NSF-G-11309
AFOSR 66-0486

Unclassified report

Revision of manuscript submitted 2 Nov 64. Research supported in part by ONR.

Availability: Published in The Physical Review v130 n2B pB318-30 Jul 26 1965. Copies to DDC users only.

Descriptors: (*Deuterons, Inelastic scattering), (*Nickel, Deuteron bombardment), (*Zirconium, Deuteron bombardment), (*Tin, Deuteron bombardment), Nuclear spins, Parity, Field theory, Excitation, Nuclear energy levels, Probability, Nuclei

Inelastic scattering of 15-MeV deuterons from Ni60, Zr92, and Sn120 nuclei was studied with adequate resolution to enable identification of almost all states of known spin and parity. Detailed angular distributions of deuteron groups corresponding to well-resolved states of these nuclei was measured and compared with distorted-wave Born approximation calculations for single excitations using a deformed optical-model potential. The theoretical predictions, including Coulomb excitation and for a complex coupling, are found to be quite successful for strongly excited states. The status of the Blair phase rule is discussed in the context of the aforesaid comparison. Spin and parity assignments are made for several new le-

vels. Excitation energies, differential cross sections, and reduced transition probabilities were tabulated and compared with previously known values. (Author)

AD-630 307 Fld. 20/8, 20/10
COLORADO UNIV BOULDER
ANALYTIC PROPERTIES OF THE PARTIAL WAVE AMPLITUDES FOR PRODUCTION PROCESSES IN THE COMPLEX J-PLANE,
by A. O. Barut, and Y. C. Leung. 1964, 12p.
Contract AF-AFOSR-30-63,
AFOSR 66-0456

Unclassified report

Presented at the Lorentz Group Symposium, Institute for Theoretical Physics, University of Colorado, Summer, 1964.

Availability: Published in Lectures in Theoretical Physics v7A p285-94 1965. Copies to DDC users only.

Descriptors: (*Pair production, Quantum mechanics), (*Quantum mechanics, Pair production), Momentum, Wave functions, Nuclear scattering

AD-630 308 Fld. 20/8, 20/10
CALIFORNIA UNIV BERKELEY DEPT OF PHYSICS
USE OF ANGULAR-MOMENTUM TENSORS,
by Charles Zemach. 7 May 65, 14p. Contract AF-AFOSR-232-64,
AFOSR 66-0017

Unclassified report

Availability: Published in The Physical Review v140 n1B pB97-108 11 Oct 1965. Copies to DDC users only.

Descriptors: (*Tensor analysis, Momentum), (*Elementary particles, Momentum), Nuclear spins, Wave functions, Quantum mechanics, Operators (Mathematics)

The properties of tensor representations are developed for application to angular-momentum problems in elementary-particle reactions. (Author)

AD-630 309 Fld. 20/8, 20/10
CALIFORNIA UNIV BERKELEY DEPT OF PHYSICS
THREE-BODY N/D EQUATIONS. I. INTEGRAL ANGULAR MOMENTA,
by Stanley Mandelstam. 10 Jun 65, 24p. Contract AF-AFOSR-232-64,
AFOSR 66-0020

Unclassified report

Availability: Published in The Physical Review v140 n2B pB375-96 Oct 25 1965. Copies to DDC users only.

Descriptors: (*N-body problem, Nuclear scattering), (*Integral equations, N-body problem), (*Momentum, Nuclear scattering), Field theory

Equations are derived for calculating three-body partialwave amplitudes once all singularities other than the unitarity discontinuity are known. The equations can easily be reduced to Fredholm equations. They have a similar structure to the two-body equations, but are more complicated owing to the presence of disconnected diagrams. The D function is related to the form factor in the usual way, and it has the expected zeros and cuts on the unphysical sheet. A subsidiary problem which is treated is the determination of a function with kinematical branch points when the discontinuities across the dynamical cuts on all sheets are known. Also, a brief discussion is given of the many-channel analog of the Omnes equation. This discussion may be useful to those who do not wish to study the mathematical theory in detail. (Author)

AD-630 320 Fld. 20/8, 20/10
MARYLAND UNIV COLLEGE PARK DEPT OF PHYSICS AND ASTRONOMY
KE3 DECAY AND UNIVERSALITY IN CABIBBO'S THEORY OF LEPTONIC DECAYS,
by S. Oneda, and J. Sucher. 22 Nov 65, 5p. Contract AF-AFOSR-500-64 ,NSF-GP-3221
AFOSR 66-0444

Unclassified report

Availability: Published in Physical Review Letters v15 n24 p927-9 Dec 13 1965. Copies to DDC users only.

Descriptors: (*Leptons, Decay schemes), (*K mesons, Decay schemes), (*Beta decay, Theory), Equations, Meson reactions, Pions, Electrons, Neutrinos

It is shown that the use of 1C sq.-1/< or = 1-5%, where C is a renormalization factor, and the most recent 'best value' of the Ke3 decay rate, together with the inclusion of hitherto neglected form-factor effects in the determination of Cabibbo's bare coupling constant for beta decay (G cos theta) from this rate, may yield a value of cos theta which is in quite close agreement with that experimentally determined from beta decay.

AD-630 349 Fld. 20/8, 18/8
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH WRIGHT-PATTERSON AFB OHIO
ANALYSIS OF TRIPLE-CORRELATION MEASUREMENTS,
by Gale I. Harris, Hans J. Nennecke, and D. D. Watson. 26 Apr 65, 16p. Rept. no. ARL-65-261,

Unclassified report

Availability: Published in The Physical Review v139 n5B p1113-24 6 Sep 1965. Copies to DDC users only.

Descriptors: (*Decay schemes, Measurement), Statistical functions, Correlation techniques, Tensor analysis, Gamma rays, Cascade structures

The formalism for the analysis of angular-correlation measurements of the radiative decay of aligned nuclei is expressed in a manner such as to simplify computational procedures involved in cases where several continuous parameters (multipolarity mixing ratios and population numbers or statistical tensors) and their error matrix must be determined from the experimental data. Two specific analysis procedures are presented. The discussion is based upon triple-correlation formulas which include the possibility of one or more intermediate unobserved radiations in multiple cascades. Parallel developments are presented in terms of population parameters and statistical tensors of the aligned states. It is shown that a statistical-tensor representation leads to a more elegant and convenient formulation for general multiple cascades. (Author)

AD-630 355 Fld. 20/8
BRANDEIS UNIV WALTHAM MASS DEPT OF PHYSICS
RADIATIVE LEPTON PRODUCTION BY A NEUTRINO BEAM,
by J. Barclay Adams. 18 Jun 65, 12p. Contract AF 49 (638)-1389,AF-AFOSR-368-63 Proj. AF-9751, Task 975101,
AFOSR 66-0433

Unclassified report

Prepared in cooperation with Stanford Univ., Calif. Inst. of Theoretical Physics.

Availability: Published in The Physical Review v140 n4B pB1131-40 Nov 1965. Copies to DDC users only.

Descriptors: (*Particle beams, Nuclear reactions), (*Neutrinos, Particle beams), (*Leptons, Nuclear reactions), Neutron reactions, Muons, Perturbation theory, Protons, Probability, Nuclear moments, Nuclear resonance,

The reaction neutrino + n to muon + p + gamma theory type model for the nonradiative reaction (neutrino + n to muon + p) are added electromagnetic interaction of the particles involved. Total and differential cross sections are computed for several neutrino energies in the BeV range. Results when normalized to the nonradiative cross sections are found to be insensitive to parameters in the model except the nucleon anomalous moments. For high-energy neutrinos, the effect of the anomalous moments is manifest as a striking peak in the photon spectrum when displayed as d-sigma/d lnk versus lnk. This offers the possibility of testing for the excitation of higher nucleon resonances in the reaction. (Author)

AD-630 361 Fld. 20/8, 20/10
INSTITUTE FOR ADVANCED STUDY PRINCETON N J
POLES IN THE VERTEX FUNCTION, ZEROS OF THE PROPAGATOR, AND BOUNDS ON COUPLING CONSTANTS,
by Y. S. Jin, and S. W. MacDowell. 21 Sep 64, 10p. Contract AF-AFOSR-42-64 Proj. AF-9751 Task 975101,
AFOSR 66-0450

Unclassified report

Availability: Published in The Physical Review v137 n3B pB688-95 Feb 8 1965. Copies to DDC users only.

Descriptors: (*Field theory, Elementary particles), Nuclear scattering, Propagation, N-body problem, Nuclear models

Extending the arguments by Goebel and Sakita, it is shown in a general framework that a pole of the proper vertex function does not lead to a pole in the scattering amplitude. Connections between zeros of the propagator, poles of the proper vertex function, and upper bounds on the coupling constant are discussed in rather general terms as well as in terms of the Zachariasen model. By making use of the analytic continuation of the partial-wave scattering amplitude into the complex angular-momentum plane, a possible physical interpretation of the vertex function is given. (Author)

AD-630 362 Fld. 20/8
INSTITUTE FOR ADVANCED STUDY PRINCETON N J
SOME SIMPLE CONSEQUENCES OF SU (4) SYMMETRY.
Revised ed.,
by Ching-Hung Woo, and Alex J. Dragt. 7 Apr 65, 4p. Contract AF-AFOSR-42-64, Proj. AF-9751, Task 975101,
AFOSR 66-0462

Unclassified report

Revision of manuscript submitted 23 Mar 65.

Availability: Published in The Physical Review v139 n4B pB945-6 Aug 23 1965. Copies to DDC users only.

Descriptors: (*Field theory, Groups (Mathematics)), (*Groups (Mathematics), Field theory), Elementary particles, Magnetic moments

The electromagnetic properties of the nucleons and N*, as well as the meson-baryon coupling constants, are examined within the framework of an SU (4) symmetry combining spin and isospin. The motivation is to examine the consequences of such a symmetry at low energies without having to worry about the large mass differences within the SU (3) multiplets in the corresponding SU (6) theory. The coupling-constant ratios are in qualitative agreement with the experimental values. The arbitrariness in the proton-neutron magnetic-moment ratio is discussed. In the model where the electromagnetic interaction of the baryons is mediated by the vector mesons in the adjoint represen-

tation of SU (4), the magnetic-moment ratios agree with the SU (6) results. (Author)

AD-630 365 Fld. 20/8
INSTITUTE FOR ADVANCED STUDY PRINCETON N J
PHASE REPRESENTATION AND HIGH-ENERGY BEHAVIOR OF THE FORWARD SCATTERING AMPLITUDE,
by Y. S. Jin, and S. W. MacDowell. 21 Jan 65, 10p. Contract AF-AFOSR-42-64, Proj. AF-9751, Task 975101,
AFOSR 66-0466

Unclassified report

Availability: Published in The Physical Review v138 n5B pB1279-85 Jun 7 1965. Copies to DDC users only.

Descriptors: (*Nuclear scattering, Field theory), (*Field theory, Nuclear scattering), Elastic scattering, Phase studies

By making use of the phase representation, the relation between the high-energy behavior of the symmetric forward scattering amplitude F (x) and the asymptotic properties of the ratio cot delta = ReF/Im F is discussed. Starting assumptions are disperson relations and the Greenberg-Low bound. Lower bounds as well as upper bounds are derived. Under the assumption of the Froissart bound, it is shown that cot delta cannot stay indefinitely greater than an arbitrarily small positive number. Also if the total cross section decreases steadily to a finite limit, but slower than const/E, the real part must tend to - infinity. The results are discussed in connection with those of Khuri and Kinoshita. The unsymmetric case is also treated by the same methods. (Author)

AD-630 369 Fld. 20/8, 20/10
INSTITUTE FOR ADVANCED STUDY PRINCETON N J
QUANTUM EFFECTS ON THE ACCURACY OF MOMENTUM MEASUREMENTS,
by Ching-Hung Woo. 7 Apr 65, 6p. Contract AF-AFOSR-42-64, Proj. AF-9751, Task 975101,
AFOSR 66-0464

Unclassified report

Availability: Published in The Physical Review v139 n4B p1103-6 Aug 23 1965. Copies to DDC users only.

Descriptors: (*Momentum, Elementary particles), (*Field theory, Momentum), Quantum mechanics, Measurement

It is shown in two examples that to measure the momentum of a particle with great accuracy, allowing for large uncertainties in the position, it is still necessary to consider additional quantum effects. For the case of measurements by electromagnetic means, the uncertainties in the measurability of field strengths and of charge-current densities should be considered. Within the framework of the Bohr-Rosenfeld analysis, uncertainties in the field measurements do not limit the accuracy of momentum measurements. What happens when the Bohr-Rosenfeld approximations are not made is an open question. (Author)

AD-630 371 Fld. 20/8
INSTITUTE FOR ADVANCED STUDY PRINCETON N J
TEST FOR THE BORN-APPROXIMATION MODEL OF THE PEIERLS MECHANISM,
by Ching-Hung Woo. 14 Oct 64, 5p. Contract AF-AFOSR-42-64, Proj. AF-9751, Task 975101,
AFOSR 66-0463

Unclassified report

Availability: Published in Physical Review Letters v13 n23 p696-8 Dec 7 1964. Copies to DDC users only.

Descriptors: (*Quantum mechanics, Nuclear cross sections), (*Nuclear cross sections, Quantum mechanics), Perturbation theory, Nuclear scattering, Pair production, Mesons, Baryons

AD-630 378 Fld. 20/8, 20/10
PURDUE UNIV LAFAYETTE IND DEPT OF PHYSICS
DYNAMICAL BASIS FOR ETA-BARYON INTERACTIONS,
by S. F. Tuan. 23 Apr 65, 10p. Contract AF-AFOSR-274-64,
AFOSR 66-0075

Unclassified report

Availability: Published in The Physical Review v139 n5B pB1393-1400 Sep 6 1965. Copies to DDC users only.

Descriptors: (*Baryons, Dynamics), (*Nuclear reactions, Baryons), (*Meson reactions, Baryons), Pions, Proton reactions, K mesons, Neutron reactions, Lambda hyperons, Matrix algebra, Nuclear energy levels

The recent experimental evidence for a rapid rise in eta-baryon production near threshold in the reactions pion-minus + p to eta-null + n and K-mians + p to eta -null + lambda is analyzed on the basis of a constant-K -matrix formalism. Representative scattering lengths for the eta-baryon systems are introduced to illustrate pertinent features of the presently known experimental data. A dynamical basis for the physical situation is discussed in terms of possible new baryon states due to virtual or bound states of the eta-baryon systems. Comparison of the results with expectations from a conjectured eta octet of baryon (1/2-) states for SU (3) symmetry is briefly referred to. (Author)

AD-630 398 Fld. 20/8, 20/10
INSTITUTE OF THEORETICAL PHYSICS STANFORD UNIV CALIF
ON THE ELECTROMAGNETIC STRUCTURE OF THE YUKAWA MESON,
by L. I. Schiff. 28 Jun 65, 9p. Contract AF 49 (638)-1389,
AFOSR 66-0435

Unclassified report

Availability: Published in Progress of Theoretical Physics, Supplement, Extra Number p400-5 1965. Copies to DDC users only.

Descriptors: (*Mesons, Electromagnetic properties), (*Pions, Elastic scattering), Nuclei, Nuclear scattering, Wave functions, Potential theory

A discussion is presented of a recent proposal of Hofstadter for the measurement of the electromagnetic form factor of the Yukawa meson, by comparing the elastic scattering of positive and negative pions on an isoscalar nucleus. A formalism is developed which permits Coulomb effects to be calculated to first order without the use of Coulomb wave functions. In particular, it is shown that the Coulomb Born amplitude is not enough in itself, but that there are additional first order Coulomb effects that arise from distortion of the pion wave function by the nuclear interaction. (Author)

AD-630 401 Fld. 20/8
MINNESOTA UNIV MINNEAPOLIS SCHOOL OF PHYSICS
ANGULAR DISTRIBUTIONS FOR THE REACTION C12 (LI6, ALPHA) N14 BETWEEN 2 AND 3 MEV,
by Clark Bergman, and Russell K. Hobbie. 17 Sep 65, 4p.

Unclassified report

Sponsored in part by Office of Naval Research.

Availability: Published in The Physical Review v142 n3 p575-8 18 Feb 1966. Copies to DDC users only.

Descriptors: (*Carbon, Nuclear reactions), (*Lithium, Nuclear reactions), (*Nuclear reactions, Alpha spectra), (*Alpha spectra, Particle beams), Nitrogen, Nuclear energy levels, Nuclear cross sections, Molecular beams

Angular distributions were measured for C12 (Li6 alpha)N14 when the N14 is left in its ground state and 3.9-MeV second excited state. These extend previous measurements from 3 MeV down to 2 MeV. The discrepancy between these results and some measurements at 1.7 MeV is discussed. (Author)

AD-630 441 Fld. 20/8
PURDUE UNIV LAFAYETTE IND DEPT OF PHYSICS
HIGH-ENERGY LIMIT OF PION-NUCLEON TOTAL CROSS SECTION,
by Masao Sugawara, and Arnold Tubis. 16 Nov 64, 6p. Contract AF-AFOSR-274-64,
AFOSR 66-0070

Unclassified report

Availability: Published in The Physical Review v138 n1B pB242-5 Apr 12 1965. Copies to DDC users only.

Descriptors: (*Nucleons, Nuclear cross sections), (*Nuclear cross sections, Nucleons), (*Pions, Meson cross sections), (*Meson cross sections, Energy), Meson reactions, Elastic scattering, Absorption, Resonance

A simple estimate of the high-energy limit of the pion-nucleon total cross section is given in terms of the mass and the width of the 33 resonance and the S-wave pion-nucleon scattering lengths. The underlying assumptions are that the forward elastic (charge-nonexchange) scattering amplitude satisfies the usual (once-subtracted) dispersion relation, and that the scattering becomes dominantly absorptive in the high-energy region. This estimate gives 23 mb as the limit of the total cross section, which is in close agreement with what one obtains from a simple extrapolation of the available high-energy cross-sections. The present analysis strongly suggests that a simple correlation exists between a pronounced low-energy resonance and the high-energy limit of the scattering amplitude. (Author)

AD-630 443 Fld. 20/8, 20/10
PURDUE UNIV LAFAYETTE IND DEPT OF PHYSICS
ORIGINS OF THE LEE TRIANGLE,
by S. P. Rosen. 14 Jun 65, 6p. Contract AF-AFOSR-274-64,
AFOSR 66-0071

Unclassified report

Availability: Published in The Physical Review v140 n2B pB326-9 Oct 25 1965. Copies to DDC users only.

Descriptors: (*Decay schemes, *Hamiltonian), Baryons, Antiparticles, Nuclear reactions

AD-630 446 Fld. 20/8, 20/10
INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS TRIESTE (ITALY)
PRODUCTION AMPLITUDES. II. PARTIAL-WAVE DECOMPOSITION AND ANALYTIC CONTINUATION IN TOTAL ANGULAR MOMENTUM,
by A. O. Barut, and Y. C. Leung. 28 Dec 64, 10p. Contract AF-AFOSR-30-63,
AFOSR 66-0457

Unclassified report

Availability: Published in The Physical Review v138 n5B pB1128-35 Jun 7 1965. Copies to DDC users only.

Descriptors: (*Pair production, Quantum mechanics), (*Quantum mechanics, Pair produc-

tion), Momentum, Wave functions, Nuclear spins, Matrix algebra, Helixes, Italy

The problem of analytic continuation in total angular momentum j of a production amplitude is investigated on the basis of analyticity in one of the momentum-transfer variables z for definite combinations of helicity amplitudes which are free of certain kinematical singularities. On this basis also an upper bound for production amplitudes is obtained which has the same value for all z as the bound of a forward-scattering elastic-scattering amplitude. Furthermore, the consistency of the analyticity in the whole cut z plane is investigated. For this case the singularities in the j plane extend indefinitely to the right even if only N subtractions are made. These singularities are removed only if the spectral functions satisfy certain integral relations to the effect that they oscillate more rapidly for higher spin. When these conditions are satisfied the essential singularities of the Gribov-Pomeranchuk type need not be introduced. The analysis further shows the dynamical role played by the spin variable in an analytic S-matrix theory. (Author)

AD-630 447 Fld. 20/8, 12/1
INSTITUTE FOR ADVANCED STUDY PRINCETON NJ
REMARKS ON THE POLYNOMIAL BOUNDEDNESS IN THE MANDELSTAM REPRESENTATION,
by Y. S. Jin, and A. Martin. 19 May 64, 9p. Contract AF-AFOSR-42-64, Proj. AF-9751, Task 075101,
AFOSR 66-0449

Unclassified report

Availability: Published in Journal of Mathematical Physics v5 n10 p1406-12 Oct 1964. Copies to DDC users only.

Descriptors: (*Nuclear scattering, Field theory), (*Polynomials, Nuclear scattering), Complex variables, Functions, Elastic scattering

The Mandelstam representation is a statement about the region of analyticity and asymptotic behavior (polynomial boundedness) of a scattering amplitude. In virtue of the unitarity condition, however, these two are not completely independent. Some physical consequences, e.g., uniqueness, polynomial boundedness of the total cross section, etc., which have been already derived from the Mandelstam representation, are shown to be preserved, even if the polynomial boundedness is replaced by a somewhat weaker assumption. By making use of unitarity, analyticity, and crossing symmetry, the following type of scattering amplitude F = E + M, where E is an entire function in both variables s and t, while M denotes a Mandelstam-type function with finite number of subtraction, is shown to be ruled out. Similarly, F = EM is also ruled out, if one imposes the additional restriction that E should increase less fast than an exponential in one variable while the other is finite. (Author)

AD-630 512 Fld. 20/8
FLORIDA STATE UNIV TALLAHASSEE DEPT OF PHYSICS
ELASTIC SCATTERING OF 4-20 MEV ALPHA PARTICLES BY BE9,
by R. B. Taylor, N. R. Fletcher, and R. H. Davis. 26 Oct 64, 14p. Contract AF-AFOSR-440-65, AFOSR 66-0104

Unclassified report

Availability: Published in Nuclear Physics v65 p318-28 1965. Copies to DDC users only.

Descriptors: (*Beryllium, Alpha Bombardment), (*Alpha particles, Elastic scattering), Excitation, Alpha spectra, Nuclear spins, Theory

The scattering of alpha particles by Be9 was studied in the bombarding energy range 4-20 MeV. Eight excitation functions and sixteen angular distributions were measured. Angular distributions were analysed with an optical model which included a term coupling the target spin I to the orbital angular momentum l. The optical model parameters varied smoothly with energy over the entire range, and the value of the spin-orbit parameter Vso varied from 1.6 to 2.7 MeV. Real well depths of about 55 MeV were used. Optical model fits without the l . I term were poor especially at back angles. A smooth cut-off model analysis was also attempted with little success. (Author)

AD-629 763 See Fld. 20/10

AD-630 010 See Fld. 7/4

AD-630 137 See Fld. 7/4

AD-630 140 See Fld. 20/10

AD-630 172 See Fld. 7/4

AD-630 182 See Fld. 4/1

AD-630 183 See Fld. 4/1

AD-630 212 See Fld. 20/10

AD-630 213 See Fld. 20/10

AD-630 221 See Fld. 20/10

AD-630 224 See Fld. 20/10

AD-630 227 See Fld. 7/5

AD-630 228 See Fld. 7/5

AD-630 229 See Fld. 18/4

AD-630 230 See Fld. 18/4

AD-630 255 See Fld. 3/2

AD-630 277 See Fld. 20/10

AD-630 313 See Fld. 20/10

AD-630 321 See Fld. 20/10

AD-630 324 See Fld. 20/10

AD-630 363 See Fld. 20/10

AD-630 367 See Fld. 20/10

AD-630 375 See Fld. 20/10

AD-630 379 See Fld. 20/10

AD-630 381 See Fld. 20/10

AD-630 387 See Fld. 4/1

AD-630 389 See Fld. 9/2

AD-630 399 See Fld. 20/10

AD-630 402 See Fld. 20/10

AD-630 436 See Fld. 18/8

AD-630 438 See Fld. 14/2

AD-630 442 See Fld. 20/10

AD-630 445 See Fld. 20/10

AD-630 449 See Fld. 3/2

AD-630 507 See Fld. 20/10

AD-630 508 See Fld. 20/10

AD-630 509 See Fld. 20/10

AD-630 510 See Fld. 20/10

AD-630 511 See Fld. 20/10

AD-630 517 See Fld. 20/10

20/9. PLASMA PHYSICS

AD-629 799 Fld. 20/9
STEVENS INST OF TECH HOBOKEN NJ
MEASUREMENTS ON PLASMA VORTICES AND TURBULENCE,
by W. H. Bostick, E. Farber, W. Prior, H. Byfield and, and J. DiMarco. 1964, 12p. Contract AF 19 (628)-2398,AF-AFOSR-465-64 Proj. AF-9752, Task 975201,
AFOSR 65-2133

Unclassified report

Availability: Published in International Symposium on Diffusion of Plasma Across a Magnetic Field, Feldafing[Starnberger Germany Jun 29-Jul 3 1964 p220-31. Copies to DDC users only.

Descriptors: (*Vortices, Plasma medium), (*Plasma medium, ORTICES), (*Magnetohydrodynamics, Vortices), Turbulence, Plasma accelerators, Hydrogen, Copper, Lithium, Argon, Diffusion, Electric fields

Plasma vortices are studied in three experimental situations: (1) in plasma flow over a 3-dimensional magnetic dipole, (2) in the plasma coaxial accelerator with hydrogen gas employed, and (3) in firing a plasma gun across a magnetic field. With respect to (1) it is found that the turbulence spectrum for copper plasma contains higher frequency components than that for lithium. For (2) a series of three vortices is usually observed following the current sheet. In nitrogen and argon the vortices are smaller in diameter, more numerous, and persist longer. The measured diffusion of the shape of a vortex can be compared with the expected decay-time for ohmic losses. The frequency of the dB/dt signal of the vortices as they scan the probes is twice that of the radial electric field and the axial electric field, as it should be. The measured velocity profile of these vortices shows that they rotate with constant angular velocity (like a rigid body). In (3) the measured decay of the velocity profile can be compared with the calculated decay-by-diffusion. (Author)

AD-629 800 Fld. 20/9, 20/7
STEVENS INST OF TECH HOBOKEN NJ
PLASMA VORTICES IN THE COAXIAL PLASMA ACCELERATOR,
by W. H. Bostick, W. Prior, and E. Farber. 23 Nov 64, 4p. Contract AF 19 (628)-2398,AF-AFOSR-465-64 Proj. AF-9752, Task 975201, AFOSR 65-2134

Unclassified report

See also AD-619 527.

Availability: Published in The Physics of Fluids v8 n4 p745-47 Apr 1965. Copies to DDC users only.

Descriptors: (*Plasma medium, Particle accelerators), (*Particle accelerators, Plasma medium), Vortices, Electric currents, Electric fields, Hydrogen, Ions, Probes (Electromagnetic)

Considerations of conservation of mass and momentum flow in the plasma coaxial accelerator make it apparent that plasma eddies or vortices should be produced behind the current sheet. Measurements of axial and radial electric fields of radial current density and ion flow density, show experimentally that these vortices are present. (Author)

AD-629 924 Fld. 20/9, 4/1, 7/4
CFSTI Prices: HC $3.00 MF $0.75
ILLINOIS UNIV URBANA GASEOUS ELECTRONICS LAB
ATOMIC DENSITY MEASUREMENTS IN NITROGEN, OXYGEN, AND HYDROGEN AFTERGLOW PLASMAS,

by Ewen A. McLennan. Feb 66, 93p. Rept. no. Scientific-3,
Contract AF 19 (628)-3307, Proj. AF-4642,
Task 464203,
AFCRL 66-88

Unclassified report

Descriptors: (*Plasma medium, Glow discharges), (*Glow discharges, Atomic properties), (*Nitrogen, Atomic properties), (*Oxygen, Atomic properties), (*Hydrogen, Atomic properties), Density, Measurement, Resonance absorption, Absorption spectrum, Electron spin resonance, Recombination reactions, Atomic energy levels, Radiofrequency, Calibration

Densities of ground-state N, O and H atoms, formed by dissociation of the parent molecular gases in dc and rf discharges, were measured over the range 10 to the 10th power to 10 to the 16th power/cc. Sensitive and unambiguous measurements that did not disturb the system under study were made by electron spin resonance (ESR) and atomic resonance absorption spectroscopy (RAS). Quantitative measurements were made by calibration of the atomic ESR resonance lines against an O2 ESR resonance line standard. Densities determined by ESR and by gas titration agreed within 20 per cent. Densities of ground -state atoms were investigated in the afterglows of pulsed and continuous rf discharges, and pulsed dc discharges, in both stationary and flowing gases. Dissociation of the parent molecular gas was found to be a strong function of the type of discharge and of the gas impurity content: rf discharges in gases with a few tenths per cent H2O impurity typically produced four orders of magnitude more atoms than did pulsed dc discharges in 'pure' gases. Atomic densities were measurable up to 10 sec in rf discharge afterglows. The slow recombination of the atoms provides a long-lived energy source throughout the afterglow. Experiments were performed to show that the concentration of N atoms in the afterglow of a pulsed dc discharge in N2 markedly affects the electron density, temperature, and collision frequency.

AD-629 991 Fld. 20/9, 7/4
NATIONAL BUREAU OF STANDARDS WASHINGTON D C
DEPARTURES FROM LOCAL THERMAL EQUILIBRIUM IN A MAGNETICALLY-DRIVEN SHOCK WAVE.
Revised ed.,
by K. L. Eckerle, and R. W. P. McWhirter. 1 Oct 65, 9p.

Unclassified report

Revision of manuscript submitted 15 Jun 65.

Availability: Published in The Physics of Fluids v9 n1 p81-9 Jan 1966. Copies to DDC users only.

Descriptors: (*Plasma medium, Thermal properties), Stability, Probability, Plasma generators, Shock waves, Atomic properties, Helium, Spectroscopy, Electrons, Temperature, Density, Reaction kinetics

An experimental study is reported of the time-resolved spectrum of the plasma produced by the magnetically -driven shock wave in a T-tube. It is shown that the population densities of the excited levels of helium ions in the plasma depart from the values they would have in local thermal equilibrium. On the other hand if local thermal equilibrium is assumed and the electron temperature estimated for the intensity ratio of He II (4686A) to He I (5876A) then in the conditions of the experiment an error of a factor of two in the electron temperature arises. The reason for the departure from local thermal equilibrium was shown to be the rapid rate of change of the plasma conditions (especially the electron temperature). This is so great that the ionization and recombination rates, being slower, cause certain population densities to lag behind the electron density and electron temperature. These rates were found to be consistent with the rates calculated by Bates et al. in their collisional-radiative model for the ionization and recombination of hydrogen -like ions. (Author)

AD-630 040 Fld. 20/9, 20/12
CFSTI Prices: HC $1.00 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
EXPERIMENTS ON WAVE INTERACTIONS BETWEEN PLASMA AND AN ELECTRON STREAM IN A MAGNETIC FIELD.
Technical memo.,
by J. R. Apel, and A. M. Stone. Oct 65, 21p.
Rept. no. TG-746,
Contract NOw-62-0604-c, Task X82D,

Unclassified report

Presented at the International Conference on Phenomena in Ionized Gases (7th), Belgrade (Yugoslavia), 22-27 Aug 65.

Descriptors: (*Electron beams, Magnetohydrodynamics), (*Magnetohydrodynamics, Electron beams), (*Plasma physics, Electron beams), Electrons, Cyclotron waves, Plasma oscillations, Ultrahigh frequency, Magnetic fields

Experiments have been conducted on the UHF wave interactions between a plasma and an electron stream, and comparisons made between the measured and calculated values of frequencies and wavelengths. The apparatus consists of a plasma source producing a plasma column 1 cm in diameter with n sub e adjustable between 10 to the 9th power and 10 to the 13th power/cc; an electron gun yielding 180 ma at 2000 volts, flowing coaxially with the plasma; and a collimating magnetic field of 200 oersted intensity. The theory and measurements show the instability to be due to the interaction of the electron cyclotron wave in the plasma with the 'plasma wave' in the beam. (Author)

AD-630 074 Fld. 20/9
CFSTI Prices: HC $4.00 MF $0.75
ILLINOIS UNIV URBANA GASEOUS ELECTRONICS LAB
AN INVESTIGATION OF ELECTRONIC RECOMBINATION IN HELIUM AND ARGON AFTERGLOW PLASMAS BY MEANS OF LASER INTERFEROMETRIC MEASUREMENTS,
by M. A. Gusinow, J. B. Gerardo, and J. T. Verdeyen. 15 Feb 66, 118p. Rept. no. Scientific-2,
Contract DA-ARO (D)-31-124-G582, Proj. AROD-4832-P ,DA-20010501B700
AROD 4832:7

Unclassified report

Descriptors: (*Plasma medium, Gas discharges), (*Recombination reactions, Plasma medium), Electron density, Atoms, Helium, Argon, Temperature, Density, Lasers, Interferometers, Electrons, Gases, Heating

Two helium-neon laser interferometers were used to obtain the electron and neutral atom densities in an afterglow plasma. The interferometric technique utilized allows one to obtain both the spatial and temporal dependence of the electron decay. The two gases studied were helium and argon at 2 - 8 Torr and 0.3 - 0.8 Torr respectively. The electron density was in the range of 2 x 10 to the 13th power < N (e) 10 to the 15th power/cu cm and the electron temperature in the range 1000 < T (e) < 7000 K. The electron temperature was measured by comparing the relative atomic line intensities and by inference from the recombination coefficient. The electronic recombination in helium, argon, and helium -argon mixtures was found to follow closely the predictions of Bates, Kingston, and McWhirter for collisional-radiative recombination (Proc. Phys. Soc. 83:43, (1964)). In the range of electron temperature and density studied the recombination coefficient exhibited an approximate T to the -9/2 power dependence. The electron temperature inferred from the measured recombination coefficient indicates a pronounced electron temperature gradient across the tube which is believed to be due to electron heating effects in the afterglow. (Author)

AD-630 143 Fld. 20/9
CFSTI Prices: HC $2.00 MF $0.50
RCA VICTOR CO LTD MONTREAL (QUEBEC) RESEARCH LABS
MEASUREMENTS OF ANISOTROPIC PLASMAS USING A TURNSTILE MULTIPLE PROBE POLARIMETER,
by M. P. Bachynski, J. F. Osborne, and B. W. Gibbs. Oct 65, 31p. Rept. no. scientific-2,RR-7-801-42
Contract AF 19 (628)-4071, Proj. AF-4642, Task 464202,
AFCRL 66-17

Unclassified report

Descriptors: (*Plasma medium, Measurement), (*Glow discharges, Measurement), Helium, Microwave frequency, X-gand, Electromagnetic waves, Polarization, Magnetic fields, Probes (Electromagnetic), Canada

A turnstile multiple probe polarimeter was designed for plasma diagnostics at microwave frequencies. With the polarimeter it is possible to simultaneously measure the amplitude and phase of the space quadrature components of an electromagnetic wave of arbitrary polarization. This technique is thus well-suited for determining the properties of time varying or steady state anisotropic plasma. Measurements were conducted at a frequency of 9.2 Gc on a helium afterglow in a magnetic field using both linearly polarized and circularly polarized incident plane waves. The agreement of these experiments with theory indicate that the multiple probe polarimeter can be a reliable tool for plasma measurements. (Author)

AD-630 218 Fld. 20/9
MINNESOTA UNIV MINNEAPOLIS DEPT OF ELECTRICAL ENGINEERING
AFTERGLOW STUDIES IN HELIUM,
by R. A. Gerber, G. F. Sauter, and H. J. Oskam. 30 Nov 65, 4p. Contract AF 19 (628)-4794,Nonr-710 (37)

Unclassified report

Availability: Published in Physics Letters v19 n8 p656-8 Jan 1 1966. Copies to DDC users only.

Descriptors: (*Helium, Glow discharges), Ions, Atoms, Molecules, Plasma medium, Time, Spectroscopy, Mass spectrum, Electron transitions, Recombination reactions, Mobility

Simultaneous measurements of the time dependence of the intensities of spectral lines and bands and of the number density of atomic and molecular helium ions in a decaying plasma are reported, and a preliminary interpretation is given. (Author)

AD-630 222 Fld. 20/9
MINNESOTA UNIV MINNEAPOLIS
AFTERGLOW STUDIES IN NOBLE-GAS-HYDROGEN MIXTURES,
by H. J. Oskam, and V. R. Mittelstadt. 7 Apr 65, 5p.

Unclassified report

Availability: Published in Journal of Applied Physics v36 n12 p3740-4 Dec 1965. Copies to DDC users only.

Descriptors: (*Helium group gases, Glow discharges), (*Hydrogen, Glow discharges), (*Mixtures, Helium group gases), Electron density, Plasma medium, Helium, Neon, Argon, Time, Pressure, Mobility, Ions, Gas ionization, Diffusion

The time dependence of the electron density during the afterglow period of plasma produced in heliumhydrogen, neon-hydrogen, and argon-hydrogen mixtures was measured by means of the microwave cavity method. The time dependence was found to be exponential during the later part of the afterglow period for pressures up to about 25 Torr.

The relevant time constant depended on the plasma excitation condition at all values of pressure in helium-hydrogen mixtures, while this dependence was not observed in neonhydrogen mixtures at pressure above 12 Torr and was absent in argon-hydrogen mixtures. The ion mobility values calculated from the measured ambipolar diffusion coefficients are 38 plus or minus 4 sq cm/V.sec for helium-hydrogen, 17 plus or minus 1.0 sq cm/V.sec for neon-hydrogen and 6.3 plus or minus 0.5 sq cm/V.sec for argon-hydrogen mixtures. (Author)

AD-629 779 See Fld. 14/2

AD-629 869 See Fld. 20/3

AD-629 905 See Fld. 9/5

AD-629 925 See Fld. 20/5

AD-629 984 See Fld. 20/6

AD-629 993 See Fld. 20/14

AD-629 994 See Fld. 20/14

AD-630 049 See Fld. 9/5

AD-630 128 See Fld. 20/14

AD-630 137 See Fld. 7/4

AD-630 209 See Fld. 20/14

AD-630 219 See Fld. 7/4

20/10. QUANTUM THEORY

AD-629 763 Fld. 20/10, 20/8
CFSTI Prices: HC $5.00 MF $1.00
NORTHEASTERN UNIV BOSTON MASS
RESEARCH ON ELEMENTARY PARTICLES AND RELATIVITY THEORY.
Final technical rept. 1962-1965,
by Richard Arnowitt. Dec 65, 158p. Contract AF 33 (657)-10161, Proj. AF-7114, ARL 65-254

Unclassified report

Descriptors: (*Relativity theory, Quantum mechanics), Field theory, Gravity, Scattering, Tensor analysis, Elementary particles

The work described involves a number of topics in classical and quantum relativity theory including the following: (1) Examination of asymptotic properties of general relativity in the space-like asymptotic region. (2) Critique of the Hoyle-Narlikar theory. (3) Analysis of q-number coordinate transformations. (4) Study of a quantized spinor field in an external gravitational field. (5) Study of the role of rigid bodies in relativity. (6) Analysis of scattering of a gravitational wave off a mass point. (Author)

AD-629 816 Fld. 20/10, 20/4, 12/1, 20/13
BELFER GRADUATE SCHOOL OF SCIENCE YESHIVA UNIV NEW YORK
SEPARATION OF THE INTERACTION POTENTIAL INTO TWO PARTS IN TREATING MANY-BODY SYSTEMS. I. GENERAL THEORY AND APPLICATIONS TO SIMPLE FLUIDS WITH SHORT-RANGE AND LONG-RANGE FORCES,
by J. L. Lebowitz, G. Stell, and S. Baer. 21 Dec 64, 19p. Contract AF-AFOSR508-64, AFOSR 66-0397

Unclassified report

Availability: Published in Journal of Mathematical Physics v6 n8 p1282-98 Aug 1965. Copies to DDC users only.

Descriptors: (*N-body problem, Fluid mechanics), (*Fluid mechanics, N-body problem), Thermodynamics, Statistical functions, Particles, Force (Mechanics)

Systematic methods are developed for investigating the correlation functions and thermodynamic properties of a classical system of particles interacting via a pair potential v (r) = q (r). The method is then applied to the case in which w (r) is a 'Kac potential' w (r, gamma) = gamma phi (gamma r) (v the dimensionality of the space) whose range 1/gamma is very long compared to the range of q (r). The main new feature of the method is the separation of the correlations, e. g., the two-particle Ursell function, into a short-range part and a long-range part. The two parts are defined in terms of their representation by graphs with density (or fugacity) vertices and K- and phi-bonds. A resummation of these graphs then yields a simple graphical representation for the long-range part of the correlation functions in terms of graphs with phi-bonds and 'hypervertices' made up of the short-range part of the correlations. Explicit calculations of the Helmholtz free energy is carried out to a higher order in gamma than done previously by Hemmer and it is shown how to carry out the calculation, in principle, to any order. The general method is further applied (in separate articles) to lattice gases, plasmas, and to the special problem of critical phenomena. (Author)

AD-629 820 Fld. 20/10, 8/5
BELFER GRADUATE SCHOOL OF SCIENCE YESHIVA UNIV NEW YORK
SPHERICALLY SYMMETRIC GRAVITATIONAL FIELDS,
by P. G. Bergmann, M. Cahen, and A. B. Komar. 7 Jul 64, 5p. Contract AF-AFOSR-509-64, AFOSR 65-2785

Unclassified report

Availability: Published in Journal of Mathematical Physics v6 n1 p1-5 Jan 1965. Copies to DDC users only.

Descriptors: (*Partial differential equations, Relativity theory), (*Relativity theory, Gravity), (*Gravity, Relativity theory), Numerical analysis

It is shown that the Schwarzschild solution is the only spherically symmetric solution of the Einstein vacuum field equations, even when the differentiability of the metric is weakened to the extent of permitting solutions which are C to the zero power, piecewise C to the 1st power. Petrov's purported counterexample is analyzed and shown to be essentially equivalent to Schwarzschild's example. (Author)

AD-629 871 Fld. 20/10, 20/4
BELFER GRADUATE SCHOOL OF SCIENCE YESHIVA UNIV NEW YORK
SUPPRESSION AT HIGH TEMPERATURE OF EFFECTS DUE TO STATISTICS IN THE SECOND VIRIAL COEFFICIENT OF A REAL GAS,
by Sigurd Yves Larsen, John E. Kilpatrick, Elliot H. Lieb, and Harry F. Jordan. 23 Feb 65, 5p. Contract AF-AFOSR-713-64, AFOSR 66-0396

Unclassified report

Prepared in cooperation with National Bureau of Standards, Washington, D. C., Rice Univ., Houston, Texas, Dept. of Chemistry, Los Alamos Scientific Lab., N. Mex.

Availability: Published in The Physical Review v140 n1A pA129-30 Oct 4 1965. Copies to DDC users only.

Descriptors: (*Quantum mechanics, Gases), Hamiltonian, Kinetic energy, Particles, Helium, Potential theory, Matrix algebra, Stresses, Temperature, Kinetic theory, Equations of state

It is shown that the repulsive core present in realistic two-body potentials and in hard spheres leads to the rapid suppression of the effects of statistics in the second virial coefficient, except at very low temperatures. For hard spheres, an upper bound is obtained which goes down exponentially with temperature when the latter becomes large. (Author)

AD-630 035 Fld. 20/10, 7/4
CFSTI Prices: HC $1.10 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
ON A RECENT PAPER OF GAY.
Technical memo.,
by David W. Fox, and Norman W. Bazley. Oct 65, 10p. Rept. no. TG-743, Contract NOw-62-0604-c ,AS-5-298

Unclassified report

Prepared in cooperation with Battelle Memorial Inst., Geneva (Switzerland).

Descriptors: (*Quantum mechanics, Atomic energy levels), Hamiltonian, Numerical analysis, Excitation

AD-630 037 Fld. 20/10
CFSTI Prices: HC $1.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
ERROR BOUNDS FOR APPROXIMATIONS TO EXPECTATION VALUES OF UNBOUNDED OPERATORS.
Technical memo.,
by David W. Fox, and Norman W. Bazley. Oct 65, 17p. Rept. no. TG-739, Contract NOw-62-0604-c ,AS-5-298

Unclassified report

Prepared in cooperation with Battelle Memorial Inst., Geneva (Switzerland).

Descriptors: (*Operators (Mathematics), Approximation (Mathematics)), Quantum mechanics, Hamiltonian, Functional analysis, Errors

A bound for the error between the expectation value of a self-adjoint operator B on the eigenfunction of a self -adjoint Hamiltonian H and the value given by an approximating vector, is obtained when H is a radial Schrodinger operator and B is multiplicative and unbounded. The analysis makes use of point and asymptotic estimates for the eigenfunction.

AD-630 081 Fld. 20/10, 20/1, 20/12
CALIFORNIA UNIV LOS ANGELES DEPT OF PHYSICS
NONLINEAR PHONON GENERATION,
by R. Orbach. 8 Nov 65, 2p. Contract Nonr-233 (88)

Unclassified report

Supported in part by NSF.

Availability: Published in Physical Review Letters v16 n1 p15-6 Jan 3 1966. Copies to DDC users only.

Descriptors: (*Parametric amplifiers, Phonons), (*Phonons, Production), Acoustics, Wave functions, Vector analysis, Pumping (Optical), Lasers, Paramagnetic materials

AD-630 140 Fld. 20/10, 20/8
IMPERIAL COLL OF SCIENCE AND TECHNOLOGY LONDON (ENGLAND) DEPT OF PHYSICS
GENERALIZED GOLDSTONE THEOREM,
by R. F. Streater. 16 Aug 65, 2p. Contract AF-EOAR-46-64, AFOSR 66-0102

Unclassified report

Availability: Published in Physical Review Letters v15 n11 p475-6 Sep 13 1965. Copies to DDC users only.

Descriptors: (*Elementary particles, Transformations), (*Quantum mechanics, Equations), (*Field theory, Equations), Protons, Neutrons, Mathematical models, Great Britain

The paper of Goldstone, Salam, and Weinberg (Phys. Rev. v127, p965, 1962) gave a very simple proof of an important theorem on broken symmetry: If phi-1 (chi) to phi-2 (chi) is a transformation of fields such that <phi-2 (chi)>0=n does not = O and such that the transformation is generated by a conserved current, then there must be zero-mass particles in the theory with the quantum numbers of phi-1. (The proof depends on the absence of states of negative norm.) In this paper it is shown that a significant generalization, along the same lines, can be proved; namely, if a local conserved current generates a transformation phi-1 (chi) to phi-1 (chi) between fields corresponding to particles of different mass, then there must be states in the theory with arbitrarily small mass (again in the absence of states of negative norm). The theorem is applied to the proton-neutron mass difference.

AD-630 210 Fld. 20/10
BRANDEIS UNIV WALTHAM MASS DEPT OF PHYSICS
SOME PROPERTIES OF THE QUANTUM LINEARIZED EINSTEIN FIELD,
by S. Dser, J. Trubatch, and S. Trubatch. 4 Mar 65, 9p. Contract AF-AFOSR-368-65, AFOSR 66-0431

Unclassified report

Availability: Published in Il Nuovo Cimento v39 Ser10 p1159-65 16 Oct 1965. Copies to DDC users only.

Descriptors: (*Field theory, Invariance), Relativity theory, Momentum, Tensor analysis

Some aspects of the quantized linear approximation to Einstein theory are examined, in view of their relevance to the full theory's quantization. In contrast to the otherwise similar Maxwell field case, it is seen that the Lorentz-invariance requirements on the time-translation and Lorentz-rotation generators P (o), J (oi) are not expressible in terms of simple local commutation relations for the energy density with itself. This is in agreement with the expectation that such local relations apply only to fields of spin one or lower. It is also shown that the physical requirement -P sub mu P (mu) > ar = O is fulfilled in the linearized theory. (Author)

AD-630 212 Fld. 20/10, 20/8
PURDUE UNIV LAFAYETTE IND DEPT OF PHYSICS
MASS FORMULAS AND BARYON STATES IN SU (6) SYMMETRY,
by S. F. Tuan, and Imre P. Gyuk. 24 May 65, 13p. Contract AF-AFOSR-274-64, AFOSR 66-0073

Unclassified report

Prepared in cooperation with Syracuse Univ., N. Y. Dept. of Physics.

Availability: Published in The Physical Review v140 n1B p164-74 Oct 11 1965. Copies to DDC users only.

Descriptors: (*Baryons, Mathematical models), Equations, Relativity theory, Energy, Field theory

The mass formulas of baryon states in SU (6) symmetry are examined in detail to exhibit (a) the deep structural similarity between the 56- and 70-dimensional representations and (b) the existence of a hierarchy of massbreaking terms in these formulas which suggest strongly the dominance of the contribution due to the 35 representation. Implications of this form resemblance for the existence of a possible higher symmetry, in particular relativistic generalizations of SU (6), are briefly discussed. Finally a critical analysis is made of the basis for a (70)- representation of baryon states. (Author)

AD-630 213 Fld. 20/10, 20/8
PURDUE UNIV LAFAYETTE IND
UNITARY SYMMETRY AND WEAK INTERACTIONS. III. NONLEPTONIC HYPERON DECAY,
by S. P. Rosen. 14 Sep 64, 9p. Contract AF-AFOSR-274-64, AFOSR 66-0067

Unclassified report

See also AD-614 154.

Availability: Published in The Physical Review v137 n2B pB431-7 Jan 25 1965. Copies to DDC users only.

Descriptors: (*Hyperons, Invariance), Mathematic models, Sigma hyperons, Neutrons, Pions, Transformations (Mathematics), Hamiltonian

It is shown that B. W. Lee's relation for nonleptonic hyperon decay (Phys. Rev. Lrt. v12, p83, 1964) can be derived from T-L invariance and an increment of T of 1/2, and that the vanishing of alpha (sigma-minus to neutron, pion-plus) requires the additional assumption of R invariance. The vanishing of alpha (sigma-minus to neutron, pion-minus) cannot be derived from these symmetries, and since there are no others applicable to weak interactions in SU (3), it must result from weak-interaction dynamics. A comparison is made between this theory and those of Cabibbo and Coleman, Glashow and Lee. Mathematical aspects of T-L invariance are discussed in an appendix. (Author)

AD-630 221 Fld. 20/10, 20/8
BELFER GRADUATE SCHOOL OF SCIENCE YESHIVA UNIV NEW YORK
EXACT SOLUTION OF A MANY-FERMION SYSTEM AND ITS ASSOCIATED BOSON FIELD,
by Daniel C. Mattis, and Elliott H. Lieb. 22 Sep 64, 11p. Contract AF-AFOSR-713-64, AFOSR 66-0395

Unclassified report

Prepared in cooperation with Thomas J. Watson Research Center, Yorktown Heights, N. Y.

Availability: Published in Journal of Mathematical Physics v6 n2 p304-12 Feb 1965. Copies to DDC users only.

Descriptors: (*Fermions, Mathematical models), (*Bosons, Field theory), (*Field theory, Fermions), Dielectric properties, Thermodynamics, Wave functions, Hamiltonian, Momentum

Luttinger's exactly soluble model of a one-dimensional many-fermion system is discussed. It is shown that he did not solve his model properly because of the paradoxical fact that the density operator commutators (rho (p), p (-p')), which always vanish for any finite number of particles, no longer vanish in the field-theoretic limit of a filled Dirac sea. In fact the operators rho (p) define a boson field which is ipso facto associated with the Fermi-Dirac field. This observation is then used to solve the model, and obtain the exact (and now nontrivial) spectrum, free energy, and dielectric constant. This is also extended to more realistic interactions in an Appendix. The Fermi surface parameter n-k is calculated and part. diff. opr. of n-k/part. diff. opr. of k sub absolute quan. kF = infinity, is found (i.e., there exists a sharp Fermi surface) only in the case of a sufficiently weak interaction. (Author)

AD-630 224 Fld. 20/10, 20/8
COLORADO UNIV BOULDER
ANALYTICITY, COMPLEX AND QUATERNIONIC LORENTZ GROUPS AND INTERNAL QUANTUM NUMBERS,
by A. O. Barut. 1964, 13p. Contract AF-AFOSR-30-63, AFOSR 66-0458

Unclassified report

Presented at the Lorentz Group Symposium, Institute for Theoretical Physics, Univ. of Colorado, Summer 1964.

Availability: Published in Lectures in Theoretical Physics v7A p121-31 1965. Copies to DDC users only.

Descriptors: (*Quantum statistics, Groups (Mathematics)), (*Groups (Mathematics), Quantum statistics), S-matrix, Elementary particles, Field theory

The problem of the enlargement of the Poincare group is discussed. Examples of nontrivial enlargements and group theoretical models for broken symmetry are given. In particular, the inhomogeneous complex Lorentz group of the first kind is treated in detail whose representations give a correct description of spin and isospin and leads to a mass spectrum. Furthermore, the inhomogeneous quaternionic Lorentz group (both in complex and quaternionic Hilbert space) is discussed, whose 12-parameter little group is large enough to contain ordinary spin, and in the limiting case, an approximate symmetry such as U3. (Author)

AD-630 231 Fld. 20/10, 8/5
KING'S COLL UNIV OF LONDON (ENGLAND)
THE GRAVITATIONAL COMPASS,
by P. Szekeres. 7 Oct 64, 7p. Contract AF-AFOSR-321-63, AFOSR 66-0382

Unclassified report

Availability: Published in Journal of Mathematical Physics v6 n9 p1387-91 Sep 1965. Copies to DDC users only.

Descriptors: (*Compasses, Gravity), (*Geodesics, Instrumentation), Relativity theory, Tensor analysis, Transformations (Mathematics), Matrix algebra

A purely covariant approach to general relativity, using the equation of geodesic deviation, is adopted. The physical interpretation is essentially that due to Pirani, but instead of using clouds of particles to analyze the gravitational field, a 'gravitational compass' is proposed which fulfills the same purpose. Particular attention is focussed on the different roles played by the matter and the free gravitational field. The latter splits up conveniently into a super-position of a tranverse wave component, a longitudinal component, and a 'Coulomb' field, all of which introduce 'shearing' forces on the gravitational compass, while the matter contributes a general contraction. Applications to the Friedmann cosmological models and the problem of interacting gravitational waves are discussed. (Author)

AD-630 233 Fld. 20/10
MARYLAND UNIV COLLEGE PARK DEPT OF PHYSICS AND ASTRONOMY
ON A CLASS OF THIRRING MODELS,
by C. S. Lam. 28 Apr 64, 10p. Contract AF-AFOSR-500-64, AFOSR 66-0440

Unclassified report

Availability: Published in Il Nuovo Cimento v34 Ser10 p637-44 Nov 1 1964. Copies to DDC users only.

Descriptors: (*Field theory, Model theory), Quantum mechanics, Operators (Mathematics)

A class of Thirring models self-coupled through a noncovariant current operator is investigated. It is shown that such a coupling will lead to physically meaningful results only at a fixed coupling strength. Furthermore, symmetry-breaking solutions of a kind to be specified in the text are permissible only at this particular coupling strength. The question of Goldstone zero -mass bosons is discussed. (Author)

AD-630 236 Fld. 20/10, 3/2
SOUTHWEST CENTER FOR ADVANCED STUDIES DALLAS TEX
ALL HOMOGENEOUS SOLUTIONS OF EINSTEIN'S FIELD EQUATIONS WITH INCOHERENT MATTER AND ELECTROMAGNETIC RADIATION,
by Istvan Ozsvath. 30 Nov 64, 7p. Contract AF-AFOSR-709-64 ,NSG-269-62
AFOSR 66-0379

Unclassified report

Availability: Published in Journal of Mathematical Physics v6 n8 p1265-8 Aug 1965. Copies to DDC users only.

Descriptors: (*Field theory, Equations), Electromagnetic waves, Relativity theory, Interstellar matter

In this paper the theorem is proven that the Einstein Field equations with dust and electromagnetic null field have only two homogeneous solutions. Discussions of these two solutions appear in another paper. (Author)

AD-630 277 Fld. 20/10, 20/8, 3/3
CALIFORNIA UNIV BERKELEY DEPT OF PHYSICS
INFRARED PHOTONS AND GRAVITONS,
by Steven Weinberg. 1 Jun 65, 11p. Contract AF-AFOSR-232-64,
AFOSR 66-0021

Unclassified report

Availability: Published in The Physical Review v140 n2B pB516-24 Oct 25 1965. Copies to DDC users only.

Descriptors: (*Infrared radiation, Photons), (*Photons, Infrared radiation), (*Gravity, Quantum mechanics), Elementary particles, Bremsstrahlung, Sun, Solar radiation, Celestial mechanics, Scattering, Relativity theory

It is shown that the infrared divergences arising in the quantum theory of gravitation can be removed by the familiar methods used in quantum electrodynamics. An additional divergence appears when infrared photons or gravitons are emitted from noninfrared external lines of zero mass, but it is proved that for infrared gravitons this divergence cancels in the sum of all such diagrams. (The cancellation does not occur in massless electrodynamics.) The formula derived for graviton bremsstrahlung is then used to estimate the gravitational radiation emitted during thermal collisions in the sun, and this is found to be a stronger source of gravitational radiation (though still very weak) than classical sources such as planetary motion. The conjecture of Dalitz that divergences in the Coulomb-scattering Born series may be summed to an innocuous phase factor is verified, and it is shown how this result may be extended to processes involving arbitrary numbers of relativistic or nonrelativistic particles with arbitrary spin. (Author)

AD-630 279 Fld. 20/10, 20/4
CALIFORNIA UNIV BERKELEY DEPT OF PHYSICS
VORTICES IN AN IMPERFECT BOSEGAS. III. SCATTERING OF SINGLE PARTICLE EXCITATIONS,
by Alexander L. Fetter. 24 May 65, 11p. Contract AF-AFOSR-130-65,
AFOSR 66-0373

Unclassified report

See also AD-622 848.

Availability: Published in The Physical Review v140 n2A pA452-60 Oct 18 1965. Copies to DDC users only.

Descriptors: (*Liquefied gases, Vortices), (*Vortices, Quantum mechanics), (*Elementary particles, Scattering), Quantum statistics, Bosons, S-matrix, Green's function, Phase shift, Wave functions

The scattering of single-particle excitations by a vortex in the condensate of an imperfect Bose gas is studied using the Bogoliubov approximation. The S matrix is calculated as in conventional scattering theory, and the phase shifts are determined with the Schwinger variational principle. The differential cross section in the long-wavelength limit is found to be d-sigma/ d-chi = 1/2pi (h/mc)sq (k cot)sq (1/2chi), where m is the mass of one atom and c is the speed of sound. This cross section agrees precisely with that found previously for scattering of sound by a classical vortex with circulation h/m. (Author)

AD-630 306 Fld. 20/10
BOSTON NIV MASS DEPT OF PHYSICS
OPERATOR GAUGE TRANSFORMATIONS,
by E. Corinaldesi, and P. Roman. 20 Apr 65, 6p. Contract AF-AFOSR-385-63, Proj. AF-9751, Task 975101,
AFOSR 66-0019

Unclassified report

Availability: Published in American Journal of Physics v33 n11 p939-42 Nov 1965. Copies to DDC users only.

Descriptors: (*Field theory, Transformations (Mathematics)), (*Invariance, S-matrix), Operators (Mathematics), Photons, Propagation

The Gupta-Bleuler formulation of the subsidiary condition of quantum electrodynamics in the interaction picture is reviewed. This formalism is used to construct a simple proof of the invariance of the S-matrix under q-number gauge transformations or, equivalently, under certain well-known modifications of the photon propagator.

AD-630 310 Fld. 20/10
SOUTHWEST CENTER FOR ADVANCED STUDIES DALLAS TEX
NEW HOMOGENEOUS SOLUTIONS OF EINSTEIN'S FIELD EQUATIONS WITH INCOHERENT MATTER OBTAINED BY A SPINOR TECHNIQUE,
by Istvan Ozsvath. 14 Apr 64, 24p. Contract AF-AFOSR-903-65 ,NSG-269-62
AFOSR 66-0061

Unclassified report

Availability: Published in Journal of Mathematical Physics v6 n4 p590-610 Apr 1965. Copies to DDC users only.

Descriptors: (*Relativity theory, Equations), (*Field theory, Equations), Differential geometry, Vector analysis, Groups (Mathematics), Tensor analysis

Einstein's field equations with incoherent matter are solved for the case of homogeneous spacetime, i.e., for metrics allowing a four parametric simply transitive group of motions. Two families of new solutions are obtained by use of a spinor technique. As a special result a proof emerges for Godel's theorem, which states that there exist only two homogeneous solutions of Einstein's field equations with incoherent matter and rigid rotation, namely the Godel cosmos and the Einstein stati universe. (Author)

AD-630 311 Fld. 20/10, 8/5
BRANDEIS UNIV WALTHAM MASS DEPT OF PHYSICS
CRITIQUE OF A NEW THEORY OF GRAVITATION,
by S. Deser, and F. A. E. Pirani. 24 May 65, 16p. Contract AF-AFOSR-368-65,
AFOSR 66-0448

Unclassified report

Prepared in cooperation with Northeastern Univ., Boston, Mass. Dept. of Physics.

Availability: Published in Proceedings of the Royal Society, A, v288 p133-5 1965. Copies to DDC users only.

Descriptors: (*Gravity, Field theory), (*Field theory, Gravity), (*Relativity theory, Gravity), Mathematical analysis

Hoyle and Narlikar (Proc. Roy. Soc. A, 282, 190-207, 1964) have developed a new theory of gravitation, for which they claim that it is a direct interparticle action theory, that it 'is equivalent to that of Einstein in the description of macroscopic phenomena, and hence the situation is the same so far as the classical tests of general relativity are concerned', that the sign of the gravitational constant is correctly determined, and that it has other advantages over Einstein's theory such as implying the absence of solutions representing an empty universe. In the present paper, it is shown that these claims are largely unsubstantiated. (Author)

AD-630 313 Fld. 20/10, 20/8
WAYMAN CROW LAB OF PHYSICS WASHINGTON UNIV ST LOUIS MO
DYNAMICAL CORRELATIONS AND THE NUCLEAR PHOTOEFFECT,
by Tso-Pin Wang, and John W. Clark. 3 Jul 65, 41p. Contract AF-AFOSR-62-412 ,NSF-GP-3211
AFOSR 66-0447

Unclassified report

Availability: Published in Progress of Theoretical Physics v34 n5 p776-813 Nov 1965. Copies to DDC users only.

Descriptors: (*Photonuclear reactions, Potential theory), (*Nucleons, Potential theory), Probability, Nuclear moments, Fermions, Photons, Nuclear moments, Bremsstrahlung, Wave functions, Scattering, Nuclear models

Strong dynamical correlations implied by realistic two-nucleon potentials have substantial effect on energy moments of the photonuclear cross section calculated by means of the dipole sum rules. A model is devised in which it is found that the bremsstrahlung weighted cross section, which is sensitive to the long-range behavior of the two-body correlation factor f, may be significantly decreased, and the integrated cross section and the first moment of the cross section, which are sensitive to the two-nucleon potential and to the short-range behavior of f, are strongly enhanced relative to values of these moments based on a Fermigas model and monotonic central potentials. The numerical results are not inconsistent with the most relevant experimental data.

AD-630 321 Fld. 20/10, 20/8
SOUTHWEST CENTER FOR ADVANCED STUDIES DALLAS TEX
UNITARY SYMMETRY VIEWED AS A BROKEN ROTATIONAL INVARIANCE,
by Y. Ne'eman, and I. Ozsvath. 18 Jan 65, 16p. Contract AF-AFOSR-903-65 ,NSG-269-62
AFOSR 66-0062

Unclassified report

Prepared in cooperation with California Inst. of Tech., Pasadena.

Availability: Published in The Physical Review v138 n6B pB1474-87 Jun 21 1965. Copies to DDC users only.

Descriptors: (*Quantum mechanics, Invariance), (*Nuclear spins, Invariance), Decay schemes, Baryons, Matrix algebra, Beta decay, Operators (Mathematics)

The incorporation of delta Q = delta S currents into SU (3) theory implies its extension into an R (8) symmetry. Universality requires that these 'skew' currents have a much weaker coupling than the delta S = -delta Q transitions. The R (8) currents may cause the breakdown of CP invariance as suggested by Wolfenstein. An R (8) model

would not allow the existence of SU (3) triplets. (Author)

AD-630 322 Fld. 20/10
BRANDEIS UNIV WALTHAM MASS DEPT OF PHYSICS
MINIMUM SIZE OF DENSE SOURCE DISTRIBUTIONS IN GENERAL RELATIVITY,
by S. Deser, R. Arnowitt, and C. W. Misner. 8 Feb 65, 23p. Contract AF-AFOSR-368-63, AFOSR 66-0437

Unclassified report

Prepared in cooperation with Maryland Univ., College Park. Dept. of Physics and Astronomy and Northeastern Univ., Boston, Mass. Dept. of Physics.

Availability: Published in Annals of Physics v33 n1 p88-107 Jun 1965. Copies to DDC users only.

Descriptors: (*Relativity theory, Gravity), (*Gravity, Relativity theory), Magnetic fields, Equations, Tensor analysis

The properties of very dense sources of the gravitational field are examined. The sources are spherically symmetric initially static distributions of neutral or charged dust, treated as dynamical systems with no phenomenological pressure term. The exterior Schwarzschild solution is analyzed from this point of view as generated by a realistic 'bare' matter stress -tensor with appropriate initial Cauchy data. A coordinate frame is introduced in which the radial coordinate coincides with the invariant distance, and the initial value equations are solved in this frame. The systems considered become, in the limit, models for neutral and charged particles, and so provide solutions for the problems of interaction between 'point' particles and the gravitational field. It is shown that, at the instant of time symmetry, there is a minimum invariant extension for a particle, below which no solution of the field equations exists; this fact emerges especially clearly in the invariant radial frame used here. The clothed (or exterior) mass and invariant properties of the interacting systems as a function of the bare mass, charge, and extension are given. The results are in agreement with those obtained previously in another frame, in terms of whose radial coordinate the particle had vanishing extension in the limit. (Author)

AD-630 324 Fld. 20/10, 20/8
CALIFORNIA UNIV BERKELEY DEPT OF PHYSICS
DETERMINATION OF THE SPINS AND PARITIES OF RESONANCES,
by Charles Zemach. 7 May 65, 18p. Contract AF-AFOSR-232-64, AFOSR 66-0016

Unclassified report

Availability: Published in The Physical Review v140 n1B pB109-24 Oct 11 1965. Copies to DDC users only.

Descriptors: (*Nuclear spins, Tensor analysis), (*Parity, Tensor analysis), Fermions, Bosons, Resonance, Nuclear reactions, Momentum, Euler's angles, Matrix algebra, Decay schemes, Nuclear moments

The properties of angular-momentum tensors described in a previous paper (Phys. Rev. v139, pB97, 1965) are used to develop tests for the spins and parities of resonances. Fermion resonances decaying into particles of spin zero and spin one-half or spin zero and spin three-halves and boson resonances decaying into particles of spin zero and spin one are considered in some detail. Attention is given to angular correlations between production and decay configurations, both generally and in special cases such as forward production, low-energy production, and peripheral collisions. A moment analysis of the decay distributions is developed. (Author)

AD-630 363 Fld. 20/10, 20/8
INSTITUTE FOR ADVANCED STUDY PRINCETON N J
PHYSICAL PROPERTIES OF QUARKS,
by P. G. O. Freund. 8 Mar 65, 5p. Contract AF-AFOSR-42-64, Proj. AF-9751, Task 975101, AFOSR 66-0470

Unclassified report

Availability: Published in Physics Letters v15 n4 p352-3 Apr 15 1965. Copies to DDC users only.

Descriptors: (*Elementary particles, Physical properties), Mesons, Magnetic moments, Field theory

Estimations are made of the strength of the coupling of quarks to the 35 odd parity mesons.

AD-630 367 Fld. 20/10, 20/8
INSTITUTE FOR ADVANCED STUDY PRINCETON N J
SHELL MODEL OF BARYONS,
by Peter G. O. Freund, and Benjamin W. Lee. 20 Oct 64, 5p. Contract AF-AFOSR-42-64, Proj. AF-9751, Task 975101, AFOSR 66-0454

Unclassified report

Availability: Published in Physical Review Letters v13 n20 p592-5 Nov 16 1964. Copies to DDC users only.

Descriptors: (*Nuclear shell models, *Baryons), Nuclear spins, Field theory, Fermions, Wave functions, Mass spectrum

Consideration is given to some implications of the hypotheses that (1) baryons are built up of spin-1/2 fermions belonging to a unitary triplet (which are termed baryonettes); (2) within a baryon, these baryonettes move in a self-consistent central field, exhibiting a shell structure; (3) coupled spin-unitary-spin symmetry is not an intrinsic symmetry of the 'fundamental' Lagrangian, but a symmetry of the baryon wave function (in terms of baryonette coordinates) in the central -field approximation. This symmetry is broken by the residual interaction between baryonettes which is not accounted for by the central field. The basic triplet is assumed to have the charge structure (2/3, -1/3, -1/3), just as quarks, but for the present the baryon number b of baryonettes is left unspecified. Both LS -and jj-coupling shell models of baryons are discussed.

AD-630 375 Fld. 20/10, 20/8
MICHIGAN UNIV ANN ARBOR DEPT OF PHYSICS
OPTIMAL VARIATIONAL METHOD FOR PAIR CORRELATIONS IN MANY-FERMION SYSTEMS,
by James C. Porter. 10 Jun 65, 16p. Contract AF-AFOSR-274-64, AFOSR 66-0069

Unclassified report

Availability: Published in The Physical Review v140 n3A pA732-47 Nov 1 1965. Copies to DDC users only.

Descriptors: (*Fermions, Correlation techniques), Partial differential equations, Hartree-Fock approximation, Statistical functions, Integrals

By means of a suitably chosen variational principle, Euler equations are derived which generalize the Hartree-Fock equations in such a way as to include two-particle correlations. For a system of N fermions these equations involve N single-particle functions and 1/2N (N-1) pair correlation functions. The Euler equations are optimal in the sense that a more accurate estimation of the total energy would require the introduction of three-particle correlation functions and the retention of terms nonlinear in the two particle functions. Although intended primarily for use in the calculation of atomic and molecular electronic structure, the Euler equations are here used to determine the Coulomb correlation energy in the case of the high -density electron gas. The result obtained is shown to have the same leading logarithmic divergence with density as that found previously by Gell-Mann and Brueckner. (Author)

AD-630 377 Fld. 20/10, 20/13
PURDUE UNIV LAFAYETTE IND DEPT OF PHYSICS
PHASE TRANSITIONS IN SYSTEMS OF INTERACTING FERMIONS,
by S. Gartenhaus, and G. Stranahan. 7 Jan 65, 13p. Contract AF-AFOSR-274-64, AFOSR 66-0072

Unclassified report

Availability: Published in The Physical Review v138 n5A pA1346-56 May 31 1965. Copies to DDC users only.

Descriptors: (*Fermions, *Phase studies), Thermodynamics, Integral equations, Transformations

Girardeau has shown that a particular class of variational approximations for the free energy of a Fermi-Dirac system may be expressed in terms of the exact free energy of a certain soluble 'model Hamiltonian.' This exact formula for the partition function associated with the model system involves the solution of a certain nonlinear integral equation, and in the present work it is shown in detail that there is a correspondence between phase transitions in the system and the existence of multiple solutions of this equation. The connection between the existence of phase transitions and the properties of the interaction is studied, and it is shown that these phase transitions may occur for a very wide class of interactions. It is established that there is an upper bound to the temperature, above which no phase transitions will occur at any density. The extension of these results to a classical and a Bose-Einstein system is indicated, and the lattice-gas model previously studied by Mermin is re-examined in the light of the present results. (Author)

AD-630 379 Fld. 20/10, 20/8
PURDUE UNIV LAFAYETTE IND DEPT OF PHYSICS
SU (6) AND WEAK INTERACTIONS,
by S. P. Rosen, and S. Pakvasa. 23 Nov 64, 6p. Contract AF-AFOSR-274-64, AFOSR 66-0074

Unclassified report

Availability: Published in Physical Review Letters v13 n25 p773-6 Dec 21 1964. Copies to DDC users only.

Descriptors: (*Nuclear reactions, Transformations), Hamiltonian, Leptons, Hyperons

An examination is made of weak interactions in the light of SU (6), with special attention given to the transformation properties of the weak Hamiltonian H sub W.

AD-630 381 Fld. 20/10, 20/8
PURDUE UNIV LAFAYETTE IND DEPT OF PHYSICS
NONLEPTONIC HYPERON DECAY AND THE RELATIVISTIC GENERALIZATION OF SU (6),
by S. P. Rosen. 12 Apr 65, 6p. Contract AF-AFOSR-274-64, AFOSR 66-0077

Unclassified report

Availability: Published in Physical Review Letters v14 n18 p758-61 May 3 1965. Copies to DDC users only.

Descriptors: (*Hyperons, Relativity theory), Decay schemes, Transformations, Wave functions, Nuclear spins, Momentum

AD-630 384 Fld. 20/10, 3/2
SOUTHWEST CENTER FOR ADVANCED STUDIES DALLAS TEX
HOMOGENEOUS SOLUTIONS OF THE EINSTEIN-MAXWELL EQUATIONS,
by Istvan Ozsvath. 30 Nov 64, 14p. Contract AF-AFOSR-903-65 ,NSG-269-62
AFOSR 66-0471

Unclassified report

Availability: Published in Journal of Mathematical Physics v6 n8 p1255-65 Aug 1965. Copies to DDC users only.

Descriptors: (*Field theory, Invariance), (*Relativity theory, Field theory), Algebra, Algebraic topology, Differential geometry, Astrophysics

In this paper the solutions of the Einstein-Maxwell equations are investigated under the assumption that the metric of the space-time and the electromagnetic field are invariant under the transformations of a four-parametric, simply transitive group. The results can be summarized as follows: In the case of null electromagnetic fields there are two different possibilities; If the cosmological constant = 0, all the solutions are Robinson waves; if the cosmological constant does not = 0, there exists only one solution. There exist no other solutions for null electromagnetic fields. In the case of non-null electromagnetic fields two solutions are found. One metric is known having been first given by Robinson; The author gives a new solution. The question as to whether there are solutions different from these remains open. (Author)

AD-630 399 Fld. 20/10, 20/8
INSTITUTE OF THEORETICAL PHYSICS STANFORD UNIV CALIF
SPONTANEOUS SYMMETRY BREAKDOWN IN A NONLINEAR BOSON FIELD: A MODEL FOR C VIOLATION,
by G. Marx. 1 Jul 65, 13p. Contract AF 49 (638)-1389,
AFOSR 66-0475

Unclassified report

Availability: Published in The Physical Review v140 n4B pB1068-78 Nov 22 1965. Copies to DDC users only.

Descriptors: (*Bosons, Field theory), Relativity theory, Approximation (Mathematics), Transformations, Mesons, Matrix algebra

A boson field with quartic self-coupling is discussed in the BCS approximation. For certain values of the coupling constant the transition from simple products to normal ordered products by a Bogolyubov transformation implies a spontaneous breakdown of the original symmetries in the Lagrangian. In a real scalar field a discrete symmetry can be broken; in more complex fields mass splitting also occurs. If the boson is characterized by the assignment O (+-), the nonvanishing vacuum expectation value of its field operator may result in tadpole diagrams, which offer an explanation of the C-violating transitions. The experimental consequences of different coupling schemes between the O (+-) meson and other particles are discussed in detail. The role of the rho (pi)eta and rho (pi)X matrix elements is emphasized in explaining different C-violating transitions in SU (2)- and SU (3)-symmetric ways, respectively. (Author)

AD-630 402 Fld. 20/10, 20/8
HARVARD UNIV CAMBRIDGE MASS DEPT OF PHYSICS
RENORMALIZATION EFFECTS AND THE CABIBBO ANGLE,
by H. T. Nieh. 11 Oct 65, 6p. Contract AF 49 (638)-1380,
AFOSR 66-0438

Unclassified report

Availability: Published in Physical Review Letters v15 n23 p902-5 Dec 6 1965. Copies to DDC users only.

Descriptors: (*Elementary particles, *Field theory), (*Mesons, Field theory), Leptons, Tensor analysis, Wave functions

A report is made of calculations of the renormalization of the semileptonic weak coupling constants by the U (3) symmetry-breaking interactions. The consideration is based on a phenomenological field-theoretical model of U (3) symmetry breakdown, which is an extension of the idea that the symmetry breakdown is dominated by the nonvanishing expectation value of the scalar field S33. The conclusions depend essentially on meson-pole dominance approximations.

AD-630 406 Fld. 20/10
PALMER PHYSICAL LAB PRINCETON UNIV N J
WAVES, NEWTONIAN FIELDS, AND COORDINATE FUNCTIONS,
by C. W. Misner. 1964, 18p. Contract AF 49 (638)-304, Proj. AF-9751, Task 975101,
AFOSR 4530

Unclassified report

Availability: Published in Proceedings on Theory of Gravitation p189-205 1964. Copies to DDC users only.

Descriptors: (*Field theory, Wave functions), Quantum mechanics, Hamiltonian, Relativity theory, Gravity

Three topics are discussed concerning fields in the neighborhood of infinity in asymptotically flat spaces: (1) the wave-front theorem which shows that the flux of energy decreases faster than 1/r (3) on any t = const. surface of an asymptotically rectangular coordinate system in an asymptotically flat space; (2) the identification of total energy-momentum and the coordinate invariant asymptotic behavior of specific 'Newtonian' components of the metric; (3) the definition of 'gauge scalar' wave amplitudes which describe graviation radiation escaping to infinity, (or short waves in any weak field region). In addition there is brief mention of quantum theory and some indications that spacelike surfaces might exist in a quantized geometry. (Author)

AD-630 407 Fld. 20/10
SOUTHWEST CENTER FOR ADVANCED STUDIES DALLAS TEX
ENERGY CONSERVATION AS THE BASIS OF RELATIVISTIC MECHANICS. II,
by J. Ehlers, W. Rindler, and R. Penrose. May 65, 5p. Contract AF 33 (615)-1029 ,NSG-269-62
AFOSR 66-0468

Unclassified report

Prepared in cooperation with Birkbeck College, London (England).

Availability: Published in American Journal of Physics v33 n12 p995-7 Dec 1965. Copies to DDC users only.

Descriptors: (*Relativity theory, *Nuclear reactions), Energy, Quantum mechanics, Nuclear energy levels, Kinematics

From the relativity principle and the conservation of energy in particle collisions the form of the energy function is deduced, as is, the conservation of inertial mass and three-momentum. It is shown that the arguments are parallel under Einsteinian and Galilean kinematics. (Author)

AD-630 442 Fld. 20/10, 20/8
PURDUE UNIV LAFAYETTE IND DEPT OF PHYSICS
POSSIBLE NEW BARYON STATES OF SU (6) SYMMETRY,
by I. P. Gyuk, and S. F. Tuan. 26 Oct 64, 8p. Contract AF-AFOSR-274-64.
AFOSR 66-0068

Unclassified report

Availability: Published in Physical Review Letters v14 n4 p121-6 Jan 25 1965. Copies to DDC users only.

Descriptors: (*Baryons, Mathematical models), Equations, Quantum statistics, Theory

A set of solutions is proposed for the mass formulas of Beg and Singh (Phys. Rev. Letters v13 p418 1964, representing the 70 baryon states of SU (6) symmetry, based in part on the postulated existence of an ETA octet of baryon states as well as certain other input experimental information.

AD-630 444 Fld. 20/10
BRANDEIS UNIV WALTHAM MASS DEPT OF PHYSICS
ASYMPTOTIC COORDINATE CONDITIONS, THE WAVE FRONT THEOREM, AND PROPERTIES OF ENERGY AND MOMENTUM,
by R. Arnowitt. 1963, 12p. Contract AF-AFOSR-368-63, Proj. AF-9751, Task 975101,
AFOSR 66-0442

Unclassified report

Prepared in cooperation with Syracuse Univ., N. Y.

Availability: Published in No journal given. Copies to DDC users only.

Descriptors: (*Asymptotic series, Quantum mechanics), Wave functions, Theorems, Energy, Momentum, Relativity theory

AD-630 445 Fld. 20/10, 20/8
COLORADO UNIV BOULDER
REMARKS ON THE GROUP STRUCTURE OF CORBEN'S WAVE EQUATIONS,
by A. O. Barut. 1964, 6p. Contract AF-AFOSR-30-63,
AFOSR 66-0469

Unclassified report

Prepared for presentation at the Elementary Particles Conference Colorado Univ., Inst. for Theoretical Physics, Summer, 1964.

Availability: Published in Lectures in Theoretical Physics v7B p446-8 1965. Copies to DDC users only.

Descriptors: (*Quantum mechanics, Elementary particles), (*Groups (Mathematics), Quantum mechanics), Wave functions, Equations of motion, Invariance

AD-630 456 Fld. 20/10, 7/4, 9/2
CFSTI Prices: HC $15.40 MF $1.00
NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF
QUANTUM MECHANICS OF HO2. IV. CHAIN PROGRAM.
Research rept.,
by D. S. Villars. Jan 66, 158p. Rept. no. NOTS-TP-3953,
Task R360FR106/2161/R0110101,
NAVWEPS 8986

Unclassified report

See also AD-615 659.

Descriptors: (*Free radicals, Quantum mechanics), (*Peroxides, Free radicals), Programming (Computers), Stability, Hydrogen compounds, Oxides

The report updates descriptions of main programs and subroutines for six chain links for the complete ab initio solution of a configuration interaction problem of HO2 discussed in the preceding reports of this series. (Author)

AD-630 507 Fld. 20/10, 20/8
INSTITUTE FOR ADVANCED STUDY PRINCETON N J

EXPERIMENTAL IMPLICATIONS OF THE PRODUCT OF U (6) AND U (6)-INVARIANCE FOR BARYONS,
by K. Bardakci, J. M. Cornwall, P. G. O. Freund, and B. W. Lee. 2 Feb 65, 5p. Contract AF-AFOSR-42-64, Proj. AF-9751, Task 975101, AFOSR 66-0472

Unclassified report

Availability: Published in Physics Letters v15 n1 p79-81 Mar 1 1965. Copies to DDC users only.

Descriptors: (*Baryons, Invariance), Field theory, Groups (Mathematics), Parity, Nuclear spins

The product of W6 = U (6) and U (6) has been suggested recently as a condidate for the title of hadron symmetry group. Evidence is now presented from the experimental baryon spectrum in favour of this suggestion.

AD-630 508 Fld. 20/10, 20/8
INSTITUTE FOR ADVANCED STUDY PRINCETON N J
INTRINSICALLY BROKEN (THE PRODUCT OF) U (6) (AND) U (6) SYMMETRY FOR STRONG INTERACTIONS. II,
by K. Bardakci, J. M. Cornwall, P. G. O. Freund, and B. W. Lee. 4 Dec 64, 7p. Contract AF-AFOSR-42-64, Proj. AF-9751, Task 975101, AFOSR 66-0460

Unclassified report

Availability: Published in Physical Review Letters v14 n2 p48-51 Jan 11 1965. Copies to DDC users only.

Descriptors: (*Elementary particles, Relativity theory), (*Fermions, Relativity theory), Field theory, Quantum mechanics, Groups (Mathematics), Invariance, Wave functions, Parity, Transformations (Mathematics)

Extending the considerations of AD-630 509, it is shown that the group W (6) arises naturally when one enlarges the group GL (6) to a 144-parameter, noncompact group which is denoted by M (12). It is then shown that W (6) is the maximal compact subgroup of M (12).

AD-630 509 Fld. 20/10, 20/8
INSTITUTE FOR ADVANCED STUDY PRINCETON N J
INTRINSICALLY BROKEN (THE PRODUCT OF) U (6) (AND) U (6) SYMMETRY FOR STRONG INTERACTIONS,
by K. Bardakci, J. M. Cornwall, P. G. O. Freund, and B. W. Lee. 4 Nov 64, 7p. Contract AF-AFOSR-42-64, Proj. AF-9751, Task 975101, AFOSR 66-0474

Unclassified report

Availability: Published in Physical Review Letters v13 n23 p698-701 Dec 7 1964. Copies to DDC users only.

Descriptors: (*Elementary particles, Relativity theory), (*Fermions, Relativity theory), Field theory, Quantum mechanics, Groups (Mathematics), Nuclear spins, Parity, Invariance

The results of investigations that lead to the symmetry group SU (6) are extended to relativistic quantum field theory. A chain of symmetries is produced which culminates in the relationship 'W6 is identical with the product of U (6) and U (6)'. The largest members of this chain are intrinsically broken; i.e., there does not exist a total Lagrangian that posseses W6 symmetry, since the kinetic energy and mass terms will automatically break it. The symmetry will make sense in terms of a strong - coupling limit.

AD-630 510 Fld. 20/10, 20/8
INSTITUTE FOR ADVANCED STUDY PRINCETON N J
MESON-BARYON SCATTERING IN THE INTRINSICALLY BROKEN M (12) SYMMETRY SCHEME,
by J. M. Cornwall, P. G. O. Freund, and K. T. Mahanthappa. 8 Mar 65, 6p. Contract AF-AFOSR-42-64, Proj. AF-9751, Task 975101, AFOSR 66-0473

Unclassified report

Availability: Published in Physical Review Letters v14 n13 p515-7 Mar 29 1965. Copies to DDC users only.

Descriptors: (*Meson reactions, Relativity theory), (*Baryons, Scattering), Field theory, Quantum mechanics, Groups (Mathematics), S-matrix, Tensor analysis, Nuclear spins

The group M (12), proposed in AD-630 508 to underlie the symmetry of strong interactions, is applied to the problem of meson-baryon scattering. A very rich body of sum rules for scattering amplitudes appears to emerge. The significance of these sum rules is interpreted as tests for the M (12) symmetry scheme.

AD-630 511 Fld. 20/10, 20/8
INSTITUTE FOR ADVANCED STUDY PRINCETON N J
MESON COUPLINGS IN THE INTRINSICALLY BROKEN U (6) SYMMETRY SCHEME,
by K. Bardakci, J. M. Cornwall, P. G. O. Freund, and B. W. Lee. 28 Dec 64, 7p. Contract AF-AFOSR-42-64, Proj. AF-9751, Task 975101, AFOSR 66-0461

Unclassified report

Availability: Published in Physical Review Letters v14 n8 p264-7 Feb 22 1965. Copies to DDC users only.

Descriptors: (*Meson reactions, Field theory), Groups (Mathematics), Baryons, Pions, K mesons, Kinetic energy

The implications of the groups U (6) and W6 for trilinear meson interactions are discussed. It is shown that good values for parameters like the omega-rho-pion, phi-rho-pion, K*-K*-pion, and K*-rho-K coupling constants are obtained from U (6) symmetry. Based on the U (6) values of these parameters, it is possible to calculate the decay rates for, 'omega to positive-pion + negative-pion + null-pion and K*-meson to K-meson + pion + pion' reactions and obtain results in agreement with experiment. The selection rule 'phi does not go to rho + pion' is also obtained. A systematic method is given for the construction of interactions that are both U (6) and Lorentz invariant. A method for handling the intrinsic symmetry breaking due due to kinetic energy is also given.

AD-630 517 Fld. 20/10, 20/8
PURDUE UNIV LAFAYETTE IND DEPT OF PHYSICS
POSSIBLE THEORETICAL INTERPRETATIONS OF THE T=2 PI-SIGMA RESONANCE,
by I. P. Gyuk, W. A. Simmons, and S. F. Tuan. 3 Nov 64, 8p. Contract AF-AFOSR-274-64, AFOSR 66-0078

Unclassified report

Availability: Published in Il Nuovo Cimento v35 Ser10 p676-81 1965. Copies to DDC users only.

Descriptors: (*Pions, Resonance), (*Sigma hyperons, Resonance), (*Baryons, Resonance), Groups (Mathematics), K-mesons, Meson reactions, Matrix algebra, Theory

Consideration is given to the theoretical implications of a T=2 pi-Sigma resonance, with attention given to the bootstrap dynamics of a T=2 resonance and to Y2* (1415) and SU3 symmetry.

AD-629 790 **See Fld. 12/1**

AD-629 815 **See Fld. 20/8**

AD-629 819 **See Fld. 7/4**

AD-629 821 **See Fld. 20/12**

AD-629 925 **See Fld. 20/5**

AD-629 984 **See Fld. 20/6**

AD-630 055 **See Fld. 7/4**

AD-630 088 **See Fld. 20/8**

AD-630 096 **See Fld. 12/1**

AD-630 138 **See Fld. 20/8**

AD-630 172 **See Fld. 7/4**

AD-630 225 **See Fld. 20/8**

AD-630 297 **See Fld. 7/4**

AD-630 307 **See Fld. 20/8**

AD-630 308 **See Fld. 20/8**

AD-630 309 **See Fld. 20/8**

AD-630 320 **See Fld. 20/8**

AD-630 361 **See Fld. 20/8**

AD-630 369 **See Fld. 20/8**

AD-630 376 **See Fld. 20/3**

AD-630 378 **See Fld. 20/8**

AD-630 398 **See Fld. 20/8**

AD-630 443 **See Fld. 20/8**

AD-630 446 **See Fld. 20/8**

AD-630 503 **See Fld. 20/5**

AD-630 504 **See Fld. 20/5**

20/11. SOLID MECHANICS

AD-629 785 Fld. 20/11
CFSTI Prices: HC $2.00 MF $0.50
PENNSYLVANIA MILITARY COLL CHESTER
A SHORT SURVEY OF VISCOELASTIC THEORY.
Progress rept.,
by R. A. DiTaranto. 15 Jan 66, 41p. Contract N161-26236, Proj. 67-103, MEL 37/66

Unclassified report

Descriptors: (*Viscoelasticity, Theory), Mathematical models, Materials, Stresses, Strain (Mechanics), Mechanics, Structures

A short survey of viscoelastic theory is presented as a background for the structurally inclined engineer in this field. The Elementary Maxwell and Kelvin-Voigt models are considered and the response of these models to specific strain and stress excitations is given. Also presented are the mathematical interrelations among the viscoelastic material characteristics such as relaxation function, storage modulus, loss modulus, tangent loss factor, storage compliance and loss compliance, relaxation function and retardation function. Consideration is given to the effect of temperature on the characteristics of a 'thermorheologically simple' viscoelastic material as well as the testing procedures in the different frequency and time ranges. (Author)

AD-629 898 Fld. 20/11, 11/4
CFSTI Prices: HC $4.00 MF $0.75
PENNSYLVANIA STATE UNIV UNIVERSITY PARK ORDNANCE RESEARCH LAB

LOCAL AND BENDING STRESSES IN LAYERED MATERIALS WITH BONDED INTERFACE.
Technical memo.,
by B. L. Chapman. 10 Nov 65, 104p. Rept. no. TM-619-3111-06,
Contract NOw-65-0123-d,
Unclassified report

Descriptors: (*Sandwich construction, Stresses), (*Composite materials, Stresses), Bending, Bonding, Computers, Numerical analysis, Photoelasticity

The objective of this thesis was to obtain quantitative stress data for layered materials with bonded interface subjected to a static point load. Two distinct cases were considered: (1) local stresses due to a concentrated load applied to a semi-infinite composite body, and (2) bending stresses due to a point load applied to a composite beam whose vertical boundaries were fixed. A theoretical solution employing methods of numerical analysis where the composite is considered as a discrete continuum, and a experimental solution utilizing the technique of both photoelasticity and the morie method, resulted in compatible stress levels. Only stresses in the lower or core layer were considered. Variations in the stress level due to changes in material for the upper layer and thickness of the protective layer were examined. (Author)

AD-629 921 Fld. 20/11, 11/6, 19/4
CFSTI Prices: HC $3.00 MF $0.75
BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD
A METALLURGICAL STUDY OF HIGH STRAIN RATE DEFORMATION.
Rept. for 1 Mar 61-22 Oct 64,
by Coy M. Glass, Stanley K. Golaski, John J. Misey, and Gerald L. Moss. Mar 66, 57p. Proj. AF-5710, Task 15.024,
AFWL TR-66-7
Unclassified report

Descriptors: (*Metals, Impact shock), (*Impact shock, Metals), (*Deformation, Impact shock), Shock waves, Explosions, Loading (Mechanics), Impact tests, Failure (Mechanics), Fracture (Mechanics), Hardness, Microstructure, Electron microscopy, Equations of state, Terminal ballistics

A systematic study was carried out on the failure of metals subjected to explosive loading. A longitudinal shock wave is passed through a cylindrical specimen which is press fit into a specimen holder of like material. The compressive wave is reflected from the free surface and the specimen is subjected to a tensile load which causes it to fail. It is interesting to note that at pressures several times the static strength of the material, the failure mode is similar to that obtained during static loading, i.e., a necking-down of the specimen and a resultant cup-cone type fracture. Investigations have been carried out for the following materials: high purity copper, 1100 F aluminum, Armco iron, 1020, 1045, 4140 steels, and 304 stainless steel. Single crystals and polycrystalline specimen have been compared for copper. The experimental and analytical results reported are: (1) fracture times as a function of pressure; (2) shear wave velocities generated in the specimen; (3) dynamic theoretical strengths of metals; (4) the effect of size (diameter) of the specimen on its dynamic strength; (5) the influence of internal boundaries on the formation of shear waves. Theoretical treatment of the data shown that the results obtained may be explained by extending Truesdale's analysis on the propagation of an elastic wave in a pre-compressed media, and the use of the BakerEricson inequality for waves at a boundary. (Author)

AD-630 085 Fld. 20/11
CFSTI Prices: HC $3.00 MF $0.50
BERLIN TOWING TANK (WEST GERMANY)
A GENERAL EQUATION OF MOTION FOR RIGID BODIES IN INCOMPRESSIBLE FLUIDS.
Final rept.,
by Michael Schmiechen. Sep 65, 56p. Contract N62558-2552. Proj. RR-009-01-01 ,NR-062-232
Unclassified report

Descriptors: (*Equations of motion, Solids), Incompressible flow, West Germany, Momentum, Buoyancy, Inertia, Damping, Force (Mechanics), Coriolis effect

Starting from the basic concepts of classical mechanics the general equation of motion for rigid bodies was developed. Laws of forces acting in the masses of the bodies and on the surfaces of bodies moving in incompressible fluids were established. Use was made of concise analytical matrix notation which is essentially equivalent to, but more effective in operation than v. Mises' symbolic Motor-rechnung. In terms of this notation the complete equation for the motions of bodies in spaces moving with the surrounding fluids becomes extremely comprehensive. Thus it allows ready discussion of the physical phenomena represented, development of consistent equations for special cases, development of methods for the determination of the properties of the systems investigated and for the solution of the describing equations, and classification and critical reviews of former methods and results. (Author)

AD-630 269 Fld. 20/11
CFSTI Prices: HC $2.00 MF $0.50
J G ENGINEERING RESEARCH ASSOCIATES BALTIMORE MD
COLLAPSE, BUCKLING AND POST FAILURE BEHAVIOR OF CYLINDRICAL SHELLS UNDER ELEVATED TEMPERATURE AND DYNAMIC LOADS.
Technical rept.,
by Joshua E. Greenspon. Nov 65, 44p. Rept. no. TR-6,
Contract DA-18-001-AMC-707 (X),
Unclassified report

Descriptors: (*Structural shells, Failure (Mechanics)), (*Cylindrical bodies, Failure (Mechanics)), Buckling (Mechanics), Deformation, Creep, Loading (Mechanics), Dynamics, Temperature, Energy, Plasticity, Elasticity

The analytical details of representing the deformation patterns and the method for calculating the energy absorbed and the resulting deflection under normal and elevated temperature conditions due to a given loading are described. In addition to energy and impulse methods of solving the problem a deformation type variational principle is employed to set up the governing nonlinear differential equation for the time dependent deflection in the plastic region. The biaxial stress strain law used for both the normal and elevated temperature cases is an elastic linear hardening law. Of greatest importance in the report is the computation of the energy absorbed or work done by internal forces in the shell for very large plastic deformations. This work or energy can be used to compute the impulse to give a prescribed deformation; it can be used to compute the deformation for a given energy input to the shell (assuming all of it goes into plastic deformation); it can be used to compute static load for a given deformation; or it can be used as a design criterion itself. (Author)

AD-630 290 Fld. 20/11
CFSTI Prices: HC $4.60 MF $0.50
CALIFORNIA INST OF TECH PASADENA DIV OF ENGINEERING AND APPLIED SCIENCE
AN 'OPTIMAL' SOLUTION OF SAINT-VENANT'S FLEXURE PROBLEM FOR A CIRCULAR CYLINDER.
Technical rept.,
by David B. Bogy. Feb 66, 41p. Rept. no. TR-4,
Contract Nonr-220 (58), Proj. NR-064-431,
Unclassified report

Descriptors: (*Optimization, Strain (Mechanics)), (*Elasticity, Cylindrical bodies), Flexural strength, Stresses, Series, Numerical analysis

In a recent paper Sternberg and Knowles established certain minimum strain-energy properties of Saint -Venant's solutions to the relaxed Saint-Venant problem for an elastic cylinder. They proved that Saint-Venant's solutions for the case of extension, pure bending, and torsion are uniquely distinguished, among all solutions to the appropriate relaxed problem that correspond to a fixed resultant load and to pointwise vanishing shearing or normal terminal tractions, by the fact that they minimize the total strain energy. In the same paper Saint-Venant's solution for the case of bending by transverse terminal loads was shown to be no longer optimal in the foregoing sense and the optimal flexure solution was characterized implicitly as the solution to a mixed-mixed boundary-value problem for the cylinder in question. In the present investigation this optimal flexure solution is determined explicitly for a circular cylinder by means of the Papkovich-Neuber stress functions. The results obtained, which are in infinite-series form, are evaluated numerically and compared with the analogous results of Saint-Venant. The solution deduced here also supplies a quantitative illustration of Saint-Venant's principle. (Author)

AD-630 291 Fld. 20/11
CFSTI Prices: HC $3.60 MF $0.50
CALIFORNIA INST OF TECH PASADENA DIV OF ENGINEERING AND APPLIED SCIENCE
ON SAINT-VENANT'S PRINCIPLE AND THE TORSION OF SOLIDS OF REVOLUTION.
Technical rept.,
by James K. Knowles, and Eli Sternberg. Feb 66, 37p. Rept. no. TR-5,
Contract Nonr-220 (58), Proj. NR-064-431,
Unclassified report

Descriptors: (*Strain (Mechanics), Bodies of revolution), (*Torsion, Bodies of revolution), (*Bodies of revolution, Elasticity), Solids

This report contains a quantitative study of Saint-Venant's principle within the context of the pure axisymmetric torsion of bodies of revolution in classical elastostatics. Explicit estimates are established for the decay of the strain energy and of the internal stresses produced by a self-equilibrated axisymmetric torsional loading applied to one end of the body in the absence of other loads. Both solid and hollow (shell-shaped) bodies are treated. For the latter the decay in the mean twist is also estimated. (Author)

AD-630 334 Fld. 20/11
MINNESOTA UNIV MINNEAPOLIS DEPT OF AERONAUTICS AND ENGINEERING MECHANICS
VIBRATIONS OF DYNAMICAL SYSTEMS WITH QUADRATIC NONLINEARITIES,
by P. R. Sethna. 9 Mar 64, 7p. Contract AF-AFOSR-62-275,
AFOSR 65-2337
Unclassified report

Prepared for presentation at the Applied Mechanics/ Fluids Engineering Conference, Washington, D. C. Jun 7-9 1965, of the American Society of Mechanical Engineers.

Availability: Published in Journal of Applied Mechanics p1-7 1964. Copies to DDC users only.

Descriptors: (*Vibration, Dynamics), Equations of motions, Taylor's series, Stability

General two-degree-of-freedom dynamical systems with weak quadratic nonlinearities are studied. With the aid of an asymptotic method of analysis a classification of these systems is made and the more interesting subclasses are studied in detail. The study includes an examination of the

stability of the solutions. Depending on the values of the system parameters, several different physical phenomena are shown to occur. Among these is the phenomenon of amplitude-modulated motions with modulation periods that are much larger than the periods of the excitation forces. (Author)

AD-630 392 Fld. 20/11
CFSTI Prices: HC $3.00 MF $0.50
TECHNION - ISRAEL INST OF TECH HAIFA DEPT OF AERONAUTICAL ENGINEERING
ON THE STABILITY OF ECCENTRICALLY STIFFENED CYLINDRICAL SHELLS UNDER AXIAL COMPRESSION,
by Josef Singer, Menahem Baruch, and Ovadia Harari. Dec 65, 55p. Rept. no. Scientific-4,TAE-44
Contract AF-EOAR-58-63, Proj. AF-9782, Task 978201,
AFOSR 66-0613

Unclassified report

Descriptors: (*Stiffened cylinders, Stability), (*Structural shells, Stability), Compressive properties, Buckling (Mechanics), Reinforcing materials, Mathematical analysis, Israel

The eccentricity effect of stiffeners is studied for stiffened cylindrical shells under axial compression. Classical simple supports and classical clamped ends are considered. A detailed physical explanation of the causes of the eccentricity effect and its behavior is proposed and verified by computations for 350 typical shells. As for buckling under hydrostatic pressure and torsion studied earlier, the behavior of the eccentricity effect in the case of axial compression also depends very strongly on the geometry of the shell, represented by the Batdorf parameter, while the geometry of the stiffeners only influences its magnitude. Inversion of eccentricity effect occurs at very low Z, but for practical dimensions outside stringers always stiffen the shell more than inside ones. The eccentricity effect has a pronounced maximum at practical values of Z, and the behavior of the eccentricity effect is very similar for clamped and simply supported shells. Rings, which are much less effective stiffeners than stringers under axial compression, are also considered. Results are compared with those of other investigators. (Author)

AD-630 413 Fld. 20/11
CFSTI Prices: HC $1.60 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
SOLVING THE PROBLEM OF A SYMMETRICALLY DEFORMED CONICAL SHELL OF LINEARLY VARIBLE THICKNESS ON THE ELECTRONIC MACHINE 'STRILLA',
by Ya. M. Grigorenko, and N. O. Lobkova. 1 Feb 66, 11p. Rept. no. FTD-TT-65-1375, TT 66-60828

Unclassified report

Unedited rough draft trans. of Prikladnaya Mekhanika (USSR) v6 n2 p224-8 1960.

Descriptors: (*Structural shells, Deformation), (*Conical bodies, Deformation), Thickness, Functional analysis, Differential equations, Series, Mechanical properties, USSR, Digital computers

AD-630 414 Fld. 20/11
CFSTI Prices: HC $7.05 MF $1.75
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
INVESTIGATION ON ELASTICITY AND PLASTICITY (COLLECTION OF ARTICLES).
11 Jan 66, 405p. Rept. no. FTD-MT-64-450, TT 66-60829

Unclassified report

Edited machine trans. of Issledovaniya po Uprugosti i Plastichnosti (USSR) n2 347p 1963.

Descriptors: (*Elasticity, Theory), (*Plasticity, Theory), Mathematical analysis, Structural shells, Stresses, Strain (Mechanics), Modulus of elasticity, Fracture (Mechanics), Propagation, Cylindrical bodies, Vibration, Bending, Mechanical properties, Laminated plastics

In the collection there are published investigations carried out in the department of theory of elasticity of the mathematics department of Leningrad University. Published articles pertain to questions of theory of plasticity, two and three-dimensional problems of theory of elasticity, statics and vibrations of thin shells, problems on destruction of solid bodies, optical methods of investigation of stresses, experimental investigations of stresses and strains in metals, bimetalic objects, and anisotropic laminar plastics. The collection is intended for scientists and engineers studying problems of strength. (Author)

AD-630 426 Fld. 20/11
CFSTI Prices: HC $2.00 MF $0.50
NORTHWESTERN UNIV EVANSTON ILL STRUCTURAL MECHANICS LAB
DYNAMIC RESPONSE OF ORTHOTROPIC CYLINDRICAL SANDWICH SHELLS UNDER INITIAL STRESS,
Technical rept.,
by Edward H. Baker, and George Herrmann. Feb 66, 50p. Rept. no. TR-66-1,
Contract AF-AFOSR-100-65, Proj. 9782, Task 978201,
AFOSR 66-0133

Unclassified report

Descriptors: (*Sandwich construction, Dynamics), (*Stresses, Structural shells), Equations of motion, Cylindrical bodies

A linearized theory of motion of cylindrical sandwich shells, subjected to a general state of initial stress, is established. The effects of orthotropic core and orthotropic facing sheets of unequal thickness are included. As an application, an analysis of free vibration is presented. (Author)

AD-630 448 Fld. 20/11
UNIVERSITY COLL CORK (EIRE)
THE LAMBDA-METHOD FOR RECTANGULAR PLATES.
Revised ed.,
by P. M. Quinlan. 30 Apr 65, 28p. Contract AF-EOAR-62-43 ,AF-EOAR-21-63
AFOSR 66-0211

Unclassified report

Revision of manuscript submitted 13 Oct 64.

Availability: Published in Proceedings of the Royal Society, A v288 p371-95 1965. Copies to DDC users only.

Descriptors: (*Metal plates, *Numerical methods + procedures), Loading (Mechanics), Elasticity, Programming (Computers)

A comprehensive method is presented for the numerical solution of the rectangular plate problem under a wide range of loadings and boundary conditions. A particular integral is obtained as a double Fourier sine series, which is the complete solution when the plate is simply supported with all edges in the same horizontal plane. This is summed to a highly convergent single series of negative exponentials in the plate variables. The necessary calculus for differentiation and integration is established, from which the particular slopes, moments and shears follow whether for concentrated or line loads or loads distributed uniformly over polygonal regions. By treating a concentrated moment as a force-pair, this case is deduced from that for a concentrated load. The necessary complementary functions and the ensuing simultaneous equations are formulated in a manner suited to programming for an electronic computer. A master program for rectangular plates has been developed in Mercury Autocode at the University of Sheffield. An illustrative example is included of a concentrated moment acting on a fully fixed rectangular plate. (Author)

AD-630 486 Fld. 20/11
CFSTI Prices: HC $1.00 MF $0.50
BROWN UNIV PROVIDENCE R I DIV OF APPLIED MATHEMATICS
A CORRESPONDENCE PRINCIPLE FOR FREE VIBRATIONS OF A VISCOELASTIC SOLID.
Technical rept.,
by George M. C. Fisher, and Marshall J. Leitman. Aug 65, 15p. Rept. no. TR-1,
Contract Nonr-562 (40), Proj. NR-064-40613-4-65,

Unclassified report

Descriptors: (*Solids, Viscoelasticity), (*Viscoelasticity, Vibration), (*Vibration, Viscoelasticity), Elasticity, Linear systems, Relaxation time, Functions, Motion, Correlation techniques

A correspondence principle was established for free vibrations in the classical linearized theory of viscoelasticity. It was shown that for motions which are either irrotational or solenoidal there is always an associated elastic problem with the following properties: (1) every mode shape for the viscoelastic problem is also a mode shape for the elastic problem; and (2) the viscoelastic frequencies can, in principle, be calculated from a knowledge of the elastic spectrum and the relevant relaxation function. It was also shown that, in general, for motions which are neither irrotational nor solenoidal, this correspondence exists only for a restricted class of viscoelastic materials. (Author)

AD-629 850 See Fld. 11/6

AD-630 251 See Fld. 11/4

20/12. SOLID STATE PHYSICS

AD-629 821 Fld. 20/12, 20/10
CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF PHYSICS
WEAK TIME DEPENDENCE IN PURE SEMICONDUCTORS.
Revised ed.,
by M. J. Stephen, and H. Suhl. 24 Nov 64, 5p. Contract AF-AFOSR-610-64, Proj. AF-9761, Task 976101,
AFOSR 65-2538

Unclassified report

Revision of manuscript submitted 30 Sep 64.

Availability: Published in Physical Review Letters v13 n26 p797-800 Dec 28 1964. Copies to DDC users only.

Descriptors: (*Superconductors, Quantum mechanics), (*Quantum mechanics, Superconductors), Quantum statistics, Solid state physics

AD-629 824 Fld. 20/12, 20/3, 11/6
CALIFORNIA UNIV LA JOLLA
SUPERCONDUCTIVITY IN THE TIN-GALLIUM SYSTEM,
by Gordon Knapp, and M. F. Merriam. 12 May 65, 4p. Contract AF-AFOSR-631-64,
AFOSR 66-0053

Unclassified report

Availability: Published in The Physical Review v140 n2A pA528-30 18 Oct 1965. Copies to DDC users only.

Descriptors: (*Tin alloys, Gallium alloys), (*Superconductivity, Tin alloys), Gallium alloys, Transition temperature, Cryogenics, Phase studies, Solid solutions, Eutectics

Superconducting transition temperatures were measured for a number of Sn-Ga compositions in both the 'quenched' (quick cast) and annealed

states. The increases in T sub c in the 'quenched' samples are not large (usually about 0.1-0.2K), and can be accounted for on the basis of internal stresses in the sample. The equilibrium transition temperatures are consistent with the known phase diagram of Predel. Within the Sn solid solution T sub c first drops (mean-free-path effect), then rises to 3.9K. Compositions in the neighborhood of the eutectic show depressed and broadened transitions; these are attributed to proximity effects. (Author)

AD-629 826 Fld. 20/12, 20/3, 11/6
CALIFORNIA UNIV LA JOLLA
EFFECT OF PRESSURE ON THE SUPERCONDUCTING TRANSITION TEMPERATURE OF LANTHANUM,
by W. E. Gardner, and T. F. Smith. 30 Nov 64, 3p. Contract AF-AFOSR-631-64, AFOSR 65-2573

Unclassified report

Availability: Published in The Physical Review v138 n2A pA484-6 19 Apr 1965. Copies to DDC users only.

Descriptors: (*Lanthanum, Superconductivity), (*Superconductivity, Lanthanum), Pressure, Transition temperature, Cryogenics

The variation of the superconducting transition temperature of hep lanthanum was measured as a function of pressure up to 10 kbar. An approximately linear increase of T sub c with applied pressure was observed (deta T/deta P about 0.00014 K/bar). The relation of this behavior to two recently proposed theories for the superconductivity of lanthanum is discussed. (Author)

AD-629 828 Fld. 20/12, 20/3, 11/6
CALIFORNIA UNIV LA JOLLA
SUPERCONDUCTIVITY OF THE ALKALI TUNGSTEN BRONZES,
by A. R. Sweedler, Ch. J. Raub, and B. T. Matthias. 15 Feb 65, 2p. Contract AF-AFOSR-631-64, AFOSR 65-2533

Unclassified report

Availability: Published in Physics Letters v15 n2 p108-9 Mar 15 1965. Copies to DDC users only.

Descriptors: (*Bronze, Superconductivity), (*Superconductivity, Bronze), Alkali metal alloys, Tungsten alloys, Sodium alloys, Cryogenics, Potassium alloys, Cesium alloys, Transition temperature, Crystal lattice

The investigation shows that the superconductivity of the Na-W bronze is not an isolated phenomenon but rather is a general property of the alkali tungsten bronzes. Superconductivity was found for all samples having either the tetragonal I or hexagonal symmetry. The lattice parameters of the superconducting phases are given. However, the perovskite phase and the tetragonal II phase of the sodium tungsten bronze was found not to become superconducting above 11 millidegrees and 40 millidegrees respectively.

AD-629 832 Fld. 20/12
CASE INST OF TECH CLEVELAND OHIO DEPT OF PHYSICS
CYCLOTRON MASSES FOR THE THIRD ZONE SURFACE IN ALUMINIUM,
by C. O. Larson, and W. L. Gordon. 20 Feb 65, 3p. Contract AF-AFOSR-536-64, AFOSR 65-2550

Unclassified report

Availability: Published in Physics Letters v15 n2 p121-22 Mar 15 1965. Copies to DDC users only.

Descriptors: (*Aluminium, Cyclotron resonance phenomena), (*Cyclotron resonance phenomena, Aluminium), Solid state physics

AD-629 840 Fld. 20/12, 20/2
STANFORD UNIV CALIF DEPT OF MATERIALS SCIENCE
DISLOCATION REACTIONS IN SILICON WEB-DENDRITE CRYSTALS,
by S. O'Hara, and G. H. Schwuttke. 22 Dec 64, 7p. Contract AF 49 (638)-1029, AF-AFOSR-731-65 Proj. AF-9761, Task 976102, AFOSR 66-0235

Unclassified report

Prepared in cooperation with International Business Machines Corp., Poughkeepsie, N. Y.

Availability: Published in Journal of Applied Physics v36 n8 p2475-9 Aug 1965. Copies to DDC users only.

Descriptors: (*Silicon, Crystal lattice defects), (*Crystal lattice defects, Silicon), Symmetry (Crystallography), X-ray diffraction analysis, Single crystals

The origin and reactions of dislocations in silicon web-dendrite crystals are discussed. In particular, x-ray topographs are compared with etching results. Dislocations having /21-1-/ axes or (110) types axes have been characterized. In the former case, normal edge and 20 degree dislocations are seen; however, an apparently new dislocation with a /21-1-/ axis and /101/ type or /110/ type of Burgers vector has also been observed. Dislocations having a /11-0/ axis and /110/ Burgers vector have been identified and associated with the Cottrell-Lomer reaction. The presence of multiple twin planes parallel to the growth direction of the web, accompanied by regions of very high dislocation density near the dendrites, increases the probability of certain dislocation reactions. (Author)

AD-629 844 Fld. 20/12
CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF MATHEMATICS
WEIGHT FACTORS FOR THE TWO-DIMENSIONAL ISING MODEL,
by Glen Baxter. 30 Nov 64, 10p. Contract AF-AFOSR-722-65, AFOSR 65-2636

Unclassified report

Availability: Published in Journal of Mathematical Physics v6 n7 p1015-21 7 Jul 1965. Copies to DDC users only.

Descriptors: (*Combinatorial analysis, *Crystal lattices), Model theory

A group of local weights is constructed for the square, honeycomb, and triangular lattices which counts for any closed path in the lattice 1/2 pi times the change in the argument of the tangent vector (mod 2) and the number of enclosed units of area (mod 2). These weights are used to evaluate the partition function of the two-dimensional Ising model with nearest-neighbor interaction and with a particular, imaginary external magnetic field. For the square lattice, the method gives a result announced by Lee and Yang. (Author)

AD-629 847 Fld. 20/12
MINNESOTA UNIV MINNEAPOLIS DEPT OF ELECTRICAL ENGINEERING
TEMPERATURE DEPENDENCE OF CONDUCTIVITY EFFECTIVE MASS OF HOLES IN GERMANIUM,
by K. S. Champlin, D. B. Armstrong, J. D. Holm, and N. A. Patrin. 19 Feb 65, 5p. Contract AF-AFOSR-606-64, Proj. AF-9761, Task 976103, AFOSR 65-2537

Unclassified report

Availability: Published in Physical Review Letters v14 n14 p547-9 Apr 5 1965. Copies to DDC users only.

Descriptors: (*Germanium, Superconductivity), Conductivity, Temperature, Relaxation time, Electrons, Cyclotron resonance phenomena, Crystal lattice defects

An extension of the Benedict-Shockley microwave experiment was used to determine the conductivity effective mass of holes in germanium throughout the temperature range between 90 and 250 K. In this interval, the mass was observed to be significantly larger than the value 0.23m (o) calculated from cyclotron resonance data and to increase markedly with temperature. If this observation is correct, the enigmatic T (-2.33) temperature dependence of the conductivity of p-type germanium actually indicates a much less severe temperature dependence of relaxation time. The optical-mode scattering mechanism that has been proposed to explain this phenomenon would thus be neither justified nor necessary. (Author)

AD-629 943 Fld. 20/12
DUKE UNIV DURHAM N C DEPT OF PHYSICS
THERMAL CONDUCTIVITY IN ISOTOPIC MIXTURES OF SOLID HELIUM,
by B. Bertman, H. A. Fairbank, R. A. Guyer, and C. W. White. 14 Sep 65, 7p. Contract DA-ARO (D)-31-124-G374, AROD 3824:4

Unclassified report

Availability: Published in The Physical Review v142 n1 p79-85 Feb 4 1966. Copies to DDC users only.

Descriptors: (*Thermal conductivity, Helium), (*Helium, Solidified gases), Heat transfer, Transport properties, Cryogenics

The paper reports thermal-conductivity measurements in isotopic mixtures of solid helium at concentrations of 1%, 4%, 10%, and 50% of He (3) in He (4) and vice versa. The data were taken at V = 19.5 cu cm/mole and V = 20.2 cu cm/mole; the data at 19.5 cu cm/mole are analyzed using the phenomenological equation of Callaway. Resistance to heat flow is assumed to be due to boundary scattering, normal-process scattering, umklapp-process scattering, and a Rayleigh-like scattering mechanism which may be a combination of mass-fluctuation scattering and lattice-distortion scattering. The strength of these scattering mechanisms is determined by the analysis. The major contribution to the thermal resistance at low temperature is found to be the lattice distortion around the site of an isotopic impurity. The intrinsic strength of latticedistortion scattering is evaluated and found to depend on concentration more strongly than the x (1-x) expected by analogy to mass-fluctuation scattering. Two arguments are given in explanation of this increased concentration dependence. (Author)

AD-629 944 Fld. 20/12
DUKE UNIV DURHAM N C DEPT OF PHYSICS
THERMAL CONDUCTIVITY OF ISOTOPIC MIXTURES OF SOLID HELIUM,
by B. Bertman, Clark W. White, and Henry A. Fairbank. 1965, 4p. Contract DA-ARO (D)-31-124-G374, AROD 3824:1

Unclassified report

Research supported in part by ONR, ARO and NSF.

Availability: Published in Low Temperature PhysicsLT9 (Part A) p266-9 1965. Copies to DDC users only. See also AD-629 943.

Descriptors: (*Thermal conductivity, Helium), (*Helium, Solidified gases), Heat transfer, Transport properties, Cryogenics

Heat transport measurements in solid helium provide both a method of studying this interesting solid in its various forms and an unusually convenient medium for checking the theory of thermal conduction in dielectric solids; of particular interest is the effect of isotopic impurities. Several workers have investigated this problem, but the

difficulty of obtaining most substances in isotopically pure form has, in most cases, prevented direct comparison with a pure sample except in the case of solid helium. Walker and Fairbank found that the presence of even very small concentrations of (3)He drastically reduced the thermal conductivity of (4)He. These measurements were limited to dilute concentrations and to the temperature range above 1 K. Research that extends these measurements to the complete isotopic concentration range including pure (3)He and (4)He, and concentrations of each in the other of approximately 1, 4, 10, and 50% is reported. Measurements were taken from 0.5K to the melting temperature at molar volumes of 19.5 and 20.2 cu cm/mole for each concentration, thus allowing both the hcp and the bcc structures to be measured for the (3)He-rich mixtures.

AD-630 013 Fld. 20/12, 11/2, 20/2
CFSTI Prices: HC $1.00 MF $0.50
RENSSELAER POLYTECHNIC INST TROY N Y
PREPARATION AND PROPERTIES OF CRYSTALLINE AND GLASSY VANADIUM PENTOXIDE.
Technical rept.,
by T. N. Kennedy, R. Hakim, and J. D. Mackenzie. Mar 66, 19p. Rept. no. TR-1,
Contract Nonr-591 (21),

Unclassified report

Descriptors: (*Vanadium compounds, Oxides), (*Single crystals, Crystal growth), (*Glass, Preparation), Films, Deposition, Semiconductors, Electrical properties, Density, Crystal structure

A special technique was developed for the preparation of single crystals of vanadium pentoxide having dimensions of 5 cm x 5 cm x 0.5 cm. Glassy films of V2O5 were also prepared by vapor deposition. The expansion coefficient, density and electrical resistivity of these phases were measured. (Author)

AD-630 083 Fld. 20/12, 20/3
CALIFORNIA UNIV LOS ANGELES DEPT OF PHYSICS
DYNAMICAL PROPERTIES OF INDUCED-MOMENT SYSTEMS.
Revised ed.,
by Bruce Grover. 22 Jul 65, 8p. Contract Nonr-233 (88),

Unclassified report

Supported in part by NSF. Revision of manuscript submitted 21 Apr 65.

Availability: Published in The Physical Review v140 n6A pA1944-51 Dec 13 1965. Copies to DDC users only.

Descriptors: (*Ferromagnetic materials, Excitation), (*Excitation, Ferromagnetic materials), Antiferromagnetism, Ferromagnetism, Europium, Praseodymium, Magnetic properties, Crystals, Magnetic moments, Thermodynamics, Theory, Mathematical analysis

The low-temperature excitation spectrum for ferroand antiferromagnets with large crystalline-field splittings is derived using the Bogoliubov transformation. Specific application is made to those systems where the single-ion ground state is a singlet and the magnetization of the coupled ions arises from the Van Vleck temperature-independent susceptibility. Pr (3+) and Eu (3+) in cubic and hexagonal environments are used as examples. The specific heat, magnetization, and nuclear-nuclear coupling are computed for both the ordered and paramagnetic regimes. The results in the paramagnetic limit display a characteristic energy gap square e root of delta (1-alpha (K/delta), where delta is the crystalline field splitting (or, in Eu (3+), the spin-orbit splitting) between the ground singlet and first excited state, K is the exchange integral, and alpha is a constant proportional to the Van Vleck temperature-independent susceptibility. In the magnetically ordered state, the same behavior is found for longitudinal excitations in Pr (3+) and Eu (3+) salts with a gap equal to (the square root of (alpha squared x K squared-delta squared)), while transverse excitations are found to exhibit a linear dispersion law without an apparent gap in the limit of complete isotropy. (Author)

AD-630 161 Fld. 20/12
SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY RAPID CITY
THERMAL AND ELECTRICAL CONDUCTIVITY OF IMPURE INDIUM ANTIMONIDE.
Technical rept.,
by R. Daniel Redin, Eldon F. Ault, Orville C. Rodenberg, and Robert G. Morris. 1965, 8p. Rept. no. TR-17,
Contract Nonr-2964 (01)

Unclassified report

Availability: Published in Proceedings of the South Dakota Academy of Science, v44 p169-75 1965. Copies to DDC users only.

Descriptors: (*Semiconductors, Transport properties), (*Thermal conductivity, Semiconductors), (*Electrical conductance, Semiconductors), (*Indium alloys, Antimony alloys), Intermetallic compounds, Impurities, Tellurium, Zinc, Cadmium, Doping, Crystal lattices

The purpose of the research was to study the electrical conductivity and thermal conductivity of indium antimonide samples which contained a large concentration of impurity atoms. The samples were single crystals. The n-type sample contained 3.3 (10) to the 18th power tellurium impurity atoms per cu cm. Two of the p-type samples contained 1.3 (10) to the 18th power and 2 (10) to the 18th power zinc atoms per cu cm. A third p-type sample contained (10) to the 20th power impurities per cu cm, half zinc and half cadmium. An impurity concentration of (10) to the 18th power per cu cm means that if one would move along a straight line in the crystal about every 30th atom would be an impurity atom. A concentration of (10) to the 20th power means that every seventh atom along a line in the crystal would be an impurity atom. The samples were cylinders 12mm in diameter and from 7mm to 12mm in height. The thermal conductivity was measured by comparing the temperature gradients along a sample and standard with the same heat flow through each (5). The electrical conductivity was determined from the voltage drop measured while an electric current was flowing. Measurements were made from room temperature to 370C.

AD-630 194 Fld. 20/12, 20/3
CFSTI Prices: HC $3.00 MF $0.50
LINCOLN LAB MASS INST OF TECH LEXINGTON
GUNN EFFECT IN COMPOUND SEMICONDUCTORS.
Technical rept.,
by Arthur G. Foyt Jr., 7 Jul 65, 54p. Rept. no. TR-385,
Contract AF 19 (628)-5167, Proj. 6941,
ESD TDR-65-306

Unclassified report

Descriptors: (*Semiconductors, Electric current), Stability, Band theory of solids, Gallium alloys, Arsenic alloys, Cadmium compounds, Tellurides, Indium alloys, Carriers (Semiconductors), Resistance (Electrical), Hydrostatic pressure, Electric fields, Mathematical models, Tellurium alloys, Cadmium alloys

A theoretical and experimental study of the Gunn effect is presented. It appears that this effect, originally observed by Gunn as a time variation in the current through ohmic samples of n-GaAs when the sample voltage exceeded a critical value, can be accounted for by the transferred electron model of Ridley and Watkins. This model is based on a transfer of electrons from a low-mass, high-mobility conduction band that is lowest in energy to a higher-mass, low-mobility band as the electron temperature is increased by the applied electric field. If the transfer occurs rapidly enough as the electric field is increased, a bulk differential negative resistance will be realized, which then leads to the formation of domains of different electrical conductivity which move through the sample, giving rise to a time-varying current. The Gunn effect was also observed in n-CdTe, and resistance vs hydrostatic pressure experiments show that the transferred electron model is a reasonable explanation for this material as well. Finally, the absence of an instability in n-InSb and n-InAs is shown to be consistent with the transferred electron model. (Author)

AD-630 364 Fld. 20/12, 11/2
LINCOLN LAB MASS INST OF TECH LEXINGTON
THE RELATION OF THE ELECTRICAL CONDUCTIVITY IN SINGLE CRYSTALS OF RHENIUM TRIOXIDE TO THE CONDUCTIVITIES OF SR2MGRE06 AND NAXW03,
by A. Ferretti, D. B. Rogers, and J. B. Goodenough. 8 Mar 65, 7p. Rept. no. JA-2520,
Contract AF 19 (628)-5167,
ESD TDR-66-26

Unclassified report

Availability: Published in The Journal of Physics and Chemistry of Solids v26 p2007-11 1965. Copies to DDC users only.

Descriptors: (*Electrical conductance, Rhenium compounds), (*Rhenium compounds, Oxides), Single crystals, Crystal lattices, Chemical bonds, Sodium compounds, Tungsten compounds, Strontium compounds, Magnesium compounds, Magnetic properties, Crystal structure, Ceramic materials

In order to discriminate experimentally between proposed models for the conduction band in the bronze system NaxWO3 (where x>0.28), the electrical transport properties of ReO3 and of Sr2MgReO6 have been investigated. A single crystal of stoichiometric ReO3 was grown by vapor transport and found to exhibit a metallic conductivity that is remarkably high for an oxide. However, polycrystalline Sr2MgReO6 was found to be a semiconductor with a room temperature resistivity of at least 100,000 ohms-cm. These data indicate that the d-electrons of ReO3 are delocalized throughout the lattice as a whole, whereas those of Sr2MgReO6 are localized on the rhenium ions or within isolated ReO6 clusters. Magnetic susceptibility measurements were made on powder samples of both materials and are shown to be consistent with these conclusions. These results suggest that the most appropriate model for metallic conductivity in transition-metal oxides structurally related to ReO3 is one involving covalent bonding via mixing of cation t sub 2g and anion p-pi orbitals. (Author)

AD-630 372 Fld. 20/12, 20/3
LINCOLN LAB MASS INST OF TECH LEXINGTON
HIGH FIELD MAGNETOABSORPTION OF THE INDIRECT TRANSITION EXCITON IN GERMANIUM AT 1.7K,
by John Halpern, and Benjamin Lax. 20 May 65, 6p. Rept. no. JA-2599,
Contract AF 19 (628)-5167,
ESD TDR-66-38

Unclassified report

Availability: Published in The Journal of Physics and Chemistry of Solids v27 p111-4 1966. Copies to DDC users only.

Descriptors: (*Germanium, Magnetic properties), (*Magnetic fields, Germanium), Cryogenics, Excitation, Atomic energy levels, Crystal structure

The indirect transition exciton magnetoabsorption was studied in the Faraday geometry with the magnetic field perpendicular to the (100), (111), and (110) crystal faces respectively. The measure-

ments were made at 1.7K and at fields of up to 74 kG. At low fields (< 40 kG) the exciton energy levels change quadratically with magnetic field, in agreement with previous work carried out in the Voigt geometry. At high (> 40 kG) fields a linear behavior is observed. The experimental observations are discussed as well as the range of applicability of the present theory to them. (Author)

AD-630 451 Fld. 20/12, 20/3, 11/6, 20/2
CFSTI Prices: HC $6.60 MF $0.75
NAVAL ORDNANCE LAB WHITE OAK MD
MAGNETOSTRICTION IN SINGLE CRYSTAL TERBIUM,
by Bernard F. DeSavage. 31 Jul 65, 69p. Rept. no. NOLTR-65-179,
Proj. FR-24,
Unclassified report

Master's thesis presented to the Maryland Univ., College Park. Prepared for presentation at Conference on Rare Earth Research, Ames, Iowa, Sep 65.

Descriptors: (*Terbium, *Magnetostriction), Single crystals, Magnetic properties, Strain gages, Experimental data, Temperature

The temperature and magnetic field dependence of the magnetostriction of single crystal terbium metal was measured in the paramagnetic range from 230 to 370K in fields H up to 25 koe. The magnetostriction is found to vary as H squares over the temperature range within which the magnetic moment is linear with H. The magnetostriction is found to follow the temperature dependence as predicted by the one-ion theory of Callen and Callen. The strains were measured along particular crystallographic directions so as to permit an evaluation of the four l = 2 coefficients described by Callen and Callen. The magnitudes of the magnetostrictive strains are in order of magnitude and sign agreement with the atomic theory of Tsuya, Clark, and Bozorth. (Author)

AD-630 452 Fld. 20/12, 20/6
CFSTI Prices: HC $2.00 MF $0.50
HARVARD UNIV CAMBRIDGE MASS DIV OF ENGINEERING AND APPLIED PHYSICS
FINAL TECHNICAL REPORT, JUNE 1, 1963-JUNE 1, 1965,
by N. Bloembergen. 1 Jun 65, 40p. Contract Nonr-1866 (49),ARPA Order-455 Proj. NR-015-807,
Unclassified report

Rept. on Proj. Defender.

Descriptors: (*Semiconductors, Optical phenomena), (*Optics, Semiconductors), Raman spectroscopy, Liquids, Lasers, Pumping (Optical), Solid state physics, Harmonic generators

Experimental work on the second harmonic production of light in reflection from semiconductors and on the stimulated Raman effect in liquids is reviewed. Five published articles, partially supported under this contract, are reproduced as appendices. (Author)

AD-630 454 Fld. 20/12
CFSTI Prices: HC $1.00 MF $0.50
CORNELL UNIV ITHACA N Y LAB OF ATOMIC AND SOLID STATE PHYSICS
HALL COEFFICIENT OF HUBBARD'S MODEL.
Technical rept.,
by David C. Langreth. Feb 66, 22p. Rept. no. TR-11,
Contract Nonr-401 (38),
Unclassified report

Prepared in cooperation with Chicago Univ., Ill., Inst. for the Study of Metals.

Descriptors: (*Hall effect, *Band theory of solids), Green's functions, Model theory, Transition metals, Integral equations, Atomic energy levels

With the aid of the Kadanoff-Baym transport equations, the high field Hall coefficient is calculated for holes in narrow bands according to Hubbard's model. It is found that the inverse Hall coefficient is proportional to the fraction of momentum space occupied by the holes, which in Hubbard's model does not equal the number of holes per atom. Therefore, the holes would not be compensated by the conduction electrons, and it is concluded that Hubbard's model in its present form is inapplicable to even-valence transition metals such as palladium and platinum.

AD-630 491 Fld. 20/12
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH WRIGHT-PATTERSON AFB OHIO
IMPURITY CONDUCTIVITY IN SINGLE CRYSTAL CDS,
by B. A. Kulp, K. A. Gale, and R. G. Schultze. 30 Apr 65, 9p. Rept. no. ARL-66-0050,
Unclassified report

Availability: Published in The Physical Review v140 n1A pA252-6 Oct 4 1965. Copies to DDC users only.

Descriptors: (*Semiconductors, Electrical conductance), (*Cadmium compounds, Sulfides), Impurities, Single crystals, Transport properties, Electrons, Band theory of solids, Heat of activation, Resistance (Electrical), Doping

The transport properties of electrons in CdS grown with Group I impurities which show the phenomenon of 'storage' have been studied to determine the mechanism of conduction. The mobility parallel to the c axis at low temperature is of the order of 1 to 10 sq cm/ volt sec and is very anisotropic, the mobility perpendicular to the c axis being 10 to 30 times that parallel to the c axis. The resistivity of the crystals shows an activation energy of about 0.001 eV at low temperature. The resistivity is very sensitive to either donor or acceptor concentration. These characteristics indicate that the conduction mechanism is not a result of electrons in the normal conduction band but is a result of an impurity conductivity. The activation energy of 0.001 eV is thought to correspond to epsilon sub 3 in silicon and germanium impurity-conduction theory. (Author)

AD-629 812 **See Fld. 7/4**

AD-629 813 **See Fld. 7/4**

AD-629 823 **See Fld. 11/6**

AD-629 830 **See Fld. 11/6**

AD-629 843 **See Fld. 11/6**

AD-629 888 **See Fld. 20/13**

AD-629 999 **See Fld. 14/2**

AD-630 014 **See Fld. 9/2**

AD-630 038 **See Fld. 9/5**

AD-630 040 **See Fld. 20/9**

AD-630 063 **See Fld. 9/1**

AD-630 064 **See Fld. 9/1**

AD-630 081 **See Fld. 20/10**

AD-630 160 **See Fld. 11/2**

AD-630 162 **See Fld. 14/2**

AD-630 181 **See Fld. 7/4**

AD-630 184 **See Fld. 20/6**

AD-630 317 **See Fld. 9/1**

20/13. THERMODYNAMICS

AD-629 831 Fld. 20/13
WASHINGTON UNIV SEATTLE
PHASE CHANGE IN ADSORBED HELIUM AT LOW TEMPERATURE,
by D. L. Goodstein, J. G. Dash, and W. D. McCormick. 20 Jul 65, 5p. Contract AF-AFOSR-62-298 ,AF-AFOSR-923-65
AFOSR 66-0378
Unclassified report

Availability: Published in Physical Review Letters v15 n10 p447-9 Sep 6 1965. Copies to DDC users only.

Descriptors: (*Helium, Phase studies), (*Liquefied gases, Helium), (*Solidified gases, Helium), Cryogenics, Adsorption, Specific heat, Monomolecular films, Surface properties

Specific-heat data are presented for adsorbed helium in the temperature range from 0.25 to 4K, at several partial monolayer coverages. The results are interpreted as indicating the existence of two surface phases.

AD-629 888 Fld. 20/13, 20/12
CFSTI Prices: HC $2.00 MF $0.50
MARYLAND UNIV COLLEGE PARK INST FOR FLUID DYNAMICS AND APPLIED MATHEMATICS
VAN DER WAALS WIGGLES, MAXWELL RULE AND TEMPERATURE-DEPENDENT EXCITATIONS.
Technical note,
by Gerard G. Emch. Mar 66, 26p. Rept. no. BN-437,
Contract Nonr-595 (22),
Unclassified report

Descriptors: (*Excitation, Temperature), (*Equations of state, Potential theory), Statistical mechanics, Phase studies, Gases, Hamiltonian, Fermions

Starting from a temperature-independant Hamiltonian, one discusses for some models the coexistence of the van der Waals wiggles and the Maxwell-van der Waals isotherms. The main tool of this paper is provided by the temperature-dependant excitations techniques developed in an earlier paper. Some ferromagnetic models and lattice-gas models are treated along similar lines. The van der Waals wiggles and the Maxwell-van der Waals isotherms appear below the critical temperature as two solutions of a system of self-consistent equations. The choice between the two solutions is then dictated by energy considerations. (Author)

AD-629 980 Fld. 20/13, 22/1, 11/3
CFSTI Prices: HC $3.75 MF $2.75
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION WASHINGTON D C
SYMPOSIUM ON THERMAL RADIATION OF SOLIDS,
by S. Katzoff. Mar 65, 590p. Rept. no. NASA-SP-55 ,N65-26855
ML TDR-64-159
Unclassified report

Prepared for presentation at symposium held at San Francisco, California, March 4, 5, 6, 1964. Research sponsored by Research and Technology Div., U. S. Air Force and National Bureau of Standards, Washington, D. C.

Descriptors: (*Thermal radiation, Solids), (*Solids, Thermal radiation), Temperature control, Spacecraft, Symposia, Reports, Metals, Surface properties, Theory, Instrumentation, Measurement, Space environmental conditions, Coating

AD-630 217 Fld. 20/13
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MECHANICAL ENGINEERING
HEAT CONDUCTION EXPERIMENTS IN RAREFIED GASES BETWEEN CONCENTRIC CYLINDERS.
Revised ed.,
by Alexander Dybbs, and George S. Springer. 16 Aug 65, 5p. Contract Nonr-1841 (93),
Unclassified report

Revision of manuscript received 3 May 65.

Availability: Published in The Physics of Fluids v8 n11 p1946-50 Nov 1965. Copies to DDC users only.

Descriptors: (*Thermal conductivity, Gases), (*Cylindrical bodies, Heat transfer), Helium, Neon, Argon, Superaerodynamics, Pressure

Experiments were performed to measure heat conduction through rarefied gases at rest contained between two concentric cylinders. The test gases used were helium, neon, and argon. The pressure was varied over a range that included free molecule, transition, and temperature jump conditions. The experimentally obtained heat conduction data were used to evaluate the results of the moment method proposed by Lees and Liu. Agreement between this method and the data was found to be within plus or minus 2.5% over the entire Knudsen number range covered in the experiments ($0.02 < Kn < 50$), assuming that the thermal accommodation coefficient at the inner cylinder remained constant over this range at its free molecule value. A comparison was also made between the data and the results of the temperature jump approximation, indicating that the heat conduction can be calculated by the temperature jump approximation within about 1% at Knudsen numbers less than approx. 0.02. (Author)

AD-630 347 Fld. 20/13, 20/4
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH WRIGHT-PATTERSON AFB OHIO
HEAT TRANSFER IN CYLINDRICAL PIPES WITH FULLY ESTABLISHED TURBULENT FLOW AND EXPOSED TO A UNIFORM TEMPERATURE ENVIRONMENT,
by J. W. Goresh. 30 Jul 65, 11p. Rept. no. ARL-65-239,
Unclassified report

Availability: Published in Transactions of the ASME Paper No 65-WA/HT-16 p1-7 Jul 30 1965. Copies to DDC users only.

Descriptors: (*Heat transfer, Pipes), (*Pipes, Heat transfer), Cylindrical bodies, Turbulence, Gases, Thermal insulation, Convection (Heat transfer), Thermal radiation Numerical analysis

The problem considered is that of determining the heat losses from a gas flowing turbulently in a poorly insulated pipe where the heat lost from the outer surface is by free convection and radiation. The approach employed in solving the heat equation is analogous to that first introduced by Latzko for the solution of the uniform wall temperature problem. Later, in 1957, Fettis obtained a solution to the same problem in terms of Jacobi polynomials. A method for coupling the inner convection with the environment is given in the later portion of the paper. The results obtained for a numerical case are also presented. (Author)

AD-629 816 **See Fld. 20/10**

AD-629 827 **See Fld. 20/4**

AD-629 960 **See Fld. 11/7**

AD-630 158 **See Fld. 7/4**

AD-630 160 **See Fld. 11/2**

AD-630 162 **See Fld. 14/2**

AD-630 377 **See Fld. 20/10**

AD-630 461 **See Fld. 7/4**

AD-630 467 **See Fld. 7/4**

AD-630 498 **See Fld. 7/4**

20/14. WAVE PROPAGATION

AD-629 878 Fld. 20/14, 9/5
CFSTI Prices: HC $1.60 MF $0.50
NAVY UNDERWATER SOUND LAB NEW LONDON CONN
THE NEAR FIELDS OF SUBSURFACE ELECTRIC DIPOLE ANTENNAS.
Research rept.,
by Peter R. Bannister, and William C. Hart. 4 Mar 66, 17p. Rept. no. USL-728,
Proj. SF-106-01-02-7077,
Unclassified report

Descriptors: (*Dipole antennas, Antenna radiation patterns), (*Antenna radiation patterns, Dipole antennas), (*Underground antennas, Dipole antennas), Electric fields, Magnetic fields, Radio waves, Propagation

The electric and magnetic field components produced by subsurface (h<or=0) vertical and horizontal electric dipole antennas are presented for the near-field range (rho comparable to lambda sub air) with z>or=0. The derived field component expressions reduce to previously derived results when $z = h = 0$. This range has been considered by many writers, but with the restriction that rho $> > z$. In this report, the authors evaluate the previously underived (to the authors' knowledge) components that are valid for any height z (neglecting ionospheric effects). (Author)

AD-629 897 Fld. 20/14
CFSTI Prices: HC $5.60 MF $0.50
PENNSYLVANIA STATE UNIV UNIVERSITY PARK ORDNANCE RESEARCH LAB
TRANSIENT WAVE PROPAGATION IN AN EXPONENTIAL MEDIUM.
Technical memo.,
by M. A. Gray. 24 Feb 66, 56p. Rept. no. TM 633.2721-03,
Contract NOw-65-0123-d,
Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), Field theory, Integral transforms, Bessel functions, Equations of motion

Electromagnetic wave propagation in a medium with an exponentially increasing charge density is studied. Both transmitted and reflected fields are found in the case of plane, monochromatic waves. The use of the bilateral Laplace transform allows the transforms of the transmitted and reflected fields to be found in the case of a stepfunction excitation moving with velocity co previous to entering the exponential medium. The reflected and transmitted fields are found explicitly when the Bessel functions obtained as solutions can be expanded asymptotically for small argument. (Author)

AD-629 904 Fld. 20/14, 9/1
CFSTI Prices: HC $4.60 MF $0.50
UTAH UNIV SALT LAKE CITY MICROWAVE DEVICE AND PHYSICAL ELECTRONICS LAB
STUDY OF TRANSVERSE WAVE INTERACTIONS.
Quarterly rept. no. 1, 1 May-31 Jul 65,
by R. L. Schriever, M. T. Ahlquist, C. H. Durney, C. C. Johnson, and R. W. Grow. Oct 65, 47p. Contract DA-28-043-AMC-01279 (E) Task DA-1P6-22001-A-055-04,
ECOM TR-01279-1
Unclassified report

Descriptors: (*Electron beams, Waveguides), (*Waveguides, Electron beams), (*Electromagnetic fields, Waveguides), Microwave equipment, Electron guns, Electrons, Cyclotron waves, Coupling circuits

Experiments with a rotating electron beam waveguide device have been performed. The device used in this investigation has been found to exhibit a strong transverse wave interaction. The interaction takes place at a frequency which is close to the cyclotron frequency of the electron beam. Frequency measurements indicate that the interaction frequency is slightly less than the cyclotron frequency and that the interaction frequency varies inversely with beam voltage. Both gain and oscillation have been observed. The interaction appears to be of a backwardwave nature. The transverse-wave interaction theory indicates that backward-wave but not forward-wave active coupling may occur. The observed values of gain are less than the calculated values but are within an order of magnitude. The interaction is found to be strong at the cutoff frequencies. This is in agreement with the transverse-wave theory. The interaction appears to be greatly influenced by the reflections in the waveguide circuit. The results of this investigation indicate that strong transverse interactions can occur in fast-wave circuits. Succeeding experimental work will require a circuit which has better transmission over a broad frequency range. This could be easily accomplished with a broadband vacuum window. An improved beam launching system is still needed if beam parameter effects are to be more carefully observed. (Author)

AD-629 916 Fld. 20/14, 9/5
CFSTI Prices: HC $1.60 MF $0.50
NAVY UNDERWATER SOUND LAB NEW LONDON CONN
THE NEAR FIELDS OF SUBSURFACE MAGNETIC DIPOLE ANTENNAS.
Research rept.,
by William C. Hart, and Peter R. Bannister. 7 Mar 66, 15p. Rept. no. USL-729,
Proj. SF-106-01-02, Task 7077,
Unclassified report

Descriptors: (*Dipole antennas, Antenna radiation patterns), (*Underground antennas, Dipole antennas), (*Antenna radiation patterns, Dipole antennas), Magnetic fields, Electric fields, Radio waves, Propagation

The electric and magnetic field components produced by subsurface ($h < or = 0$) vertical and horizontal magnetic dipoles are presented for the near-field range (rho comparable to lambda sub air) with $z > or = 0$. This range has been considered by many writers, but with the restriction that rho $> > z$. In this report, the authors evaluate the previously underived (to the authors' knowledge) components that are valid for any height z (neglecting ionospheric effects). (Author)

AD-629 993 Fld. 20/14, 20/9
CENTRAL RADIO PROPAGATION LAB BOULDER COLO
ON THE THEORY OF WAVE PROPAGATION IN A BOUNDED COMPRESSIBLE PLASMA,
by James R. Wait. 1 Nov 65, 16p. Rept. no. Scientific-31,500-11-5000422
Contract PRO-65-504, Proj. AF-4600, Task 460004,
AFCRL 65-754
Unclassified report

Availability: Published in Canadian Journal of Physics v44 p293-302 1966. Copies to DDC users only.

Descriptors: (*Electromagnetic waves, Propagation), (*Plasma physics, Electromagnetic waves), Field theory, Compressible flow, Electromagnetic wave reflections, Waveguides

The influence of boundaries on wave propagation in a compressible plasma is considered. Although the models chosen are highly idealized, a number of interesting complexities arise that may be significant in actual bounded plasma configurations. For example, it is demonstrated that a perfectly conducting metallic boundary will support a surface wave in the plasma. However, if the boundary s not perfectly rigid, the surface wave will be attenuated even when the plasma is collisionless. Certain aspects of multiple reflections between two parallel boundaries are also treated in the paper. (Author)

AD-629 994 Fld. 20/14, 20/9
CFSTI Prices: HC $5.60 MF $0.50
NORTHEASTERN UNIV BOSTON MASS DEPT OF ELECTRICAL ENGINEERING
ON WAVE PROPAGATION IN A LINEARIZED, VERTICALLY INHOMOGENEOUS PARTIALLY IONIZED GAS; FORMULATION AND MATHEMATICAL METHODOLOGY,
by Harold R. Raemer. 30 Sep 65, 55p. Rept. no. Scientific-1,
Contract AF 19 (628)-4325 ,ARPA Order-42
AFCRL 65-732

Unclassified report

Descriptors: (*Ionospheric propagation, Plasma physics), Mathematical analysis, Programming (Computers)

The problem of wave propagation in a linearized 3-component (electron, ion, neutral) gas is discussed for the case where the ambient gas parameters are arbitrary functions of the vertical coordinate in z and uniform with respect to time and the horizontal coordinates. The formulation of the problem from the Boltzmann equation to a system of simultaneous coupled linear algebraic and first order differential equations in z is discussed in some detail in the first part of the report. In the second part, mathematical methods of dealing with such systems are treated, culminating in a discussion of the numerical method finally chosen and the computer program used to obtain solutions. (Author)

AD-630 003 Fld. 20/14
CFSTI Prices: HC $3.60 MF $0.50
WASHINGTON UNIV SEATTLE DEPT OF ELECTRICAL ENGINEERING
THE FIELD ALONG THE SURFACE OF A GROUNDED DIELECTRIC SLAB COVERED BY A PERIODICALLY SLOTTED CONDUCTING PLANE.
Technical rept.,
by Rubens A. Sigelmann. Jan 66, 40p. Rept. no. TR-102,
Contract AF 19 (628)-2763, Proj. AF-5635, Task 563502,
AFCRL 66-104

Unclassified report

Descriptors: (*Field theory, Dielectrics), (*Dielectrics, Field theory), Propagation, Sampling, Integral transforms

This paper deals with the field on the surface of a dielectric slab covered by a periodically slotted conducting plane. The field is excited by a line of magnetic current. A sampling technique is used to formulate this problem. The field obtained by this method consists of a radiation field and contributions of surface and leaky waves. The beta-k diagram obtained by a sampling technique is compared with diagrams obtained by a variational method and experimentally. A graphical solution for the dispersion curve is presented. Surface waves that result from the solution in the 'improper' Riemann surfaces are discussed. (Author)

AD-630 124 Fld. 20/14, 14/2
CFSTI Prices: HC $5.00 MF $1.00
SCIENTIFIC-ATLANTA INC GA
INVESTIGATION OF PRECISION ANTENNA PATTERN RECORDING AND DISPLAY TECHNIQUES. PHASE II.
Final rept. vol. 1,
by J. Searcy Hollis, Samuel F. Hutchins, T. J. Lyon, Rezin E. Pidgeon Jr., and C. S. Young.
Feb 66, 157p. Contract AF 30 (602)-3425, Proj. AF-4506, Task 450604,
RA.. TR-65-534-vol-1

Unclassified report

Descriptors: (*Antenna radiation patterns, Measurement), (*Electronic recording systems, Antenna radiation patterns), Radio ranges, Ranges (Establishments), Antennas, Signal generators, Frequency stabilizers, Radio signals, Propagation, Measuring devices (Electrical + electronic), Display systems, Digital-to-analog converters, Ultrahigh frequency, Superhigh frequency

The purpose of the research is the development of equipment to enhance the antenna measurement capability of ground-based antenna test ranges. Theoretical studies reported herein include an investigation of environmental effects and an analysis of parallax errors as related to high-accuracy antenna measurements; and investigation of antenna-positioning techniques and angle-measuring equipment; and a determination of optimum techniques for a high-speed precision recording system.

AD-630 128 Fld. 20/14, 20/9
CFSTI Prices: HC $12.60 MF $1.00
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB
PROPAGATION AND INSTABILITIES IN BOUNDED AND FINITE TEMPERATURE PLASMAS.
Research rept.,
by Joel S. Jayson. 22 Sep 65, 124p. Rept. no. ERL-65-24,
Contract AF 33 (615)-1078 ,AF-AFOSR-139-65

Unclassified report

Descriptors: (*Electromagnetic waves, Plasma physics), (*Plasma physics, Thermal properties), Stability, Emissivity, Cyclotron waves, Synchrotrons

The quasi-static analysis is used to examine propagation and instabilities in plasmas in which both the transverse bounds and the temperature are important. Initially only longitudinal thermal velocity is assumed and two stream instabilities are studied. With the introduction of transverse temperature, instabilities resulting from temperature anisotropy are also studied. The full set of Maxwell's equations is utilized for an investigation of the effects of dispersion on the synchrotron radiation spectrum. The investigation of hot plasmas with finite boundaries was undertaken initially to explain the differences between phenomena found in experimental observations and those predicted by the cold plasma theory. Longitudinal temperature is added to the model and it is found that strong cyclotron wave damping and the absence of the cyclotron-cyclotron interaction in a two stream configuration are predicted by the theory. Introducing transverse temperature into the model, using the Boltzmann equation, instabilities arising from temperature anisotropy are investigated and it is found that, for a bi-Maxwellian distribution, for low values of k sub z the plasma is stable. The investigation of finite plasmas with transverse temperature is pursued by consideration of a configuration in which a boundary layer region is included and the particle density decreases to zero through this region. (Author)

AD-630 144 Fld. 20/14
CFSTI Prices: HC $6.60 MF $0.75
POLYTECHNIC INST OF BROOKLYN N Y MICROWAVE RESEARCH INST
LATERAL WAVES.
Research rept.,
by Leopold B. Felsen. 15 Nov 65, 63p. Rept. no. PIBMRI-1303-65,
Contract AF 19 (628)-2357, Proj. AF-5635, Task 563501,
AFCRL 65-889

Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), Dielectrics, Electrical conductance, Surface properties, Refraction, Diffraction, Anisotropy, Plasma medium, Isotropism, Reflection

When a radiator is located in a region wherein two or more wave types (1,2..) may propagate with different speeds, and when a boundary coupling these wave types is present, diffraction phenomena may arise which are describable in terms of lateral waves. A lateral wave is launched by that portion of the incident field of type 1, for example, which gives rise to a field of type 2 refracted parallel to the boundary and which in turn refracts into a field of type 1. The properties of lateral waves are reviewed in the transient and in the time-harmonic regimes. Concepts of wave coupling are emphasized, and general analytical features, as well as graphical procedures using refractive index diagrams, are described. Illustrative examples exhibit lateral waves on the interface between two homogeneous or inhomogeneous dielectrics, on a perfectly conducting plane immersed in an anisotropic and (or) compressible plasma, and also on a perfectly conducting half plane. The latter example shows how lateral waves may be diffracted by an edge discontinuity. Some relations between lateral waves, leaky waves, and spectral representations are also included. (Author)

AD-630 192 Fld. 20/14, 4/1
CFSTI Prices: HC $4.60 MF $0.50
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J
POLARIZATION VARIATION OF SATELLITE-EMITTED RADIO SIGNALS.
Technical rept.,
by P. R. Arendt, Wolfgang H. Fischer, James Grau, Haim Soicher, and Gottfried F. Vogt. Mar 66, 41p. Rept. no. ecom-2671,
Proj. DA-1P0-14501B31A Task 1P0-14501B31A01,

Unclassified report

Descriptors: (*Radio signals, Polarization), (*Ionospheric propagation, Radio signals), (*Magneto-optic effect, Radio signals), Satellites (Artificial), Very high frequency, Radio transmission, Atmospheric sounding, Electron density, Radio waves, Propagation

A new system for the measurement of the actual momentary values of the Faraday rotation polarization vectors of satellite emitted frequencies has been developed. Measurements of the relative polarization angles of the S-66 Satellite-emitted 40 to 41 Mc/s signals, from which the absolute rotation angle is obtained, have been made at one-second intervals. A comparison of momentary polarization angles at 40 and 41 Mc/s made during the center part of overhead satellite passages shows deviations from the expected inverse frequency squared relation. It has been found that correct raw data can only be obtained from the difference of simultaneous polarization measurements during a short interval when this difference is near pi radians. Correction for antenna geometry error and for non-linear system errors permits electron content evaluation with 1% precision over a latitudinal range of about ten degrees. (Author)

AD-630 209 Fld. 20/14, 20/9, 9/1
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING
WAVE PROPAGATION IN HOT PLASMA WAVEGUIDES WITH INFINITE MAGNETOSTATIC FIELDS.
Revised ed.,
by H. H. Kuehl, G. E. Stewart, and C. Yeh. 24 Nov 64, 9p. Contract AF-AFOSR-496-65, AFOSR 65-2116

Unclassified report

Revision of manuscript submitted 8 Sep 64.

Availability: Published in The Physics of Fluids v8 n4 p723-29 Apr 1965. Copies to DDC users only.

Descriptors: (*Waveguides, Propagation), (*Plasma medium, Propagation), Plasma oscillations, Magnetic fields, Mathematical analysis, Scattering, Damping, Statistical functions

Solutions of the 'dispersion relation' for an unbounded Maxwellian electron plasma are given. Solutions of the corresponding relation for a circular waveguide filled with a hot plasma with an infinite magnetostatic field are also presented. It is shown that these solutions are of importance in evaluating the fields in such waveguides since they determine the poles of the integrands which arise in the integral formulation of the problem. The integral solution for the field in the waveguide due to a general symmetric excitation at the wall of the waveguide is given. (Author)

AD-629 923 See Fld. 17/9

AD-630 049 See Fld. 9/5

AD-630 126 See Fld. 4/1

AD-630 142 See Fld. 4/1

AD-630 340 See Fld. 9/4

Field 21-PROPULSION AND FUELS

21/2. COMBUSTION AND IGNITION

AD-630 288 Fld. 21/2
CFSTI Prices: HC $1.60 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
THE CONDITION OF COMBUSTION IN NONTHERMAL ACTIVATION OF COMBUSTIBLE MIXTURE,
by B. G. Khudenko. 18 Feb 66, 19p. Rept. no. ftd-TT-65-1776, TT 66-60820

Unclassified report

Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Aviatsionnaya Tekhnika (USSR) n2 p121-31 1965.

Descriptors: (*Ignition, Particle beams), (*Combustion, Particle beams), (*Particle beams, Igniters), Radioactive isotopes, Adsorption, Fuels, Flames, Beta particles, Electric discharges, Butanes, Propanes, USSR

Ratios are proposed which permit the evaluation of the activity of sources of ionizing radiation which will ignite a combustible mixture.

AD-630 350 Fld. 21/2
LOUVAIN UNIV (BELGIUM) LAB OF INORGANIC CHEMISTRY
IDENTIFICATION OF NEGATIVE FLAME-IONS,
by A. Feugier, and A. Van Tiggelen. 1965, 8p. Contract AF EOAR-82-65 Proj. AF-7023, ARL 65-229

Unclassified report

Availability: Published in Symposium (International) on Combustion (10th) p621-4 1965. Copies to DDC users only.

Descriptors: (*Flames, Mass spectrum), (*Gas ionization, Flames), (*Mass spectroscopy, Flames), Hydrocarbons, Ions, Alkynes, Deuterated compounds, Aliphatic compounds, Methane, Additives, Ammonia, Chlorine, Concentration (Chemistry), Belgium

Negative flame-ions were identified by mass spectrometry in several hydrocarbon-oxygen flames diluted with nitrogen. The flames examined were stoichiometric mixtures of acetylene, neopentane, and methane with oxygen. Some experiments were made with 100% deuterated acetylene in order to check the hydrogen content of the most abundant ions. The masses of negative ions observed in each of these flames and their probable identity are listed in order of decreasing abundance. The effect of the addition of ammonia and chlorine on the ion distribution in these three flames are reported and a discussion is presented of the possible process of formation of these negative ions. (Author)

AD-630 409 Fld. 21/2, 21/9.2
CFSTI Prices: HC $1.60 MF $0.50
UTAH UNIV SALT LAKE CITY DEPT OF CHEMICAL ENGINEERING
COMBUSTION IRREGULARITIES IN SOLID PROPELLANTS.
Final rept., Aug 62-Aug 63,
by Norman W. Ryan. 4 Mar 66, 11p. Contract AF-AFOSR-62-451,ARPA Order-317-62 Proj. AF-9713, Task 971301, AFOSR 66-0606

Unclassified report

Descriptors: (*Solid rocket propellants, Combustion), (*Combustion, Acoustics), Stability, Oscillation, Solids, Test equipment

In studies employing the side-vented end-burner, the participation of the solid phase in acoustic oscillations was quantitatively confirmed and described. In cooperation with other laboratories, the usefulness of the burner for propellant evaluation was demonstrated. Initial experiments in a study of non-acoustic instability were performed. (Author)

AD-629 780 See Fld. 19/1

AD-629 951 See Fld. 21/5

AD-630 099 See Fld. 7/4

AD-630 278 See Fld. 21/4

21/4. FUELS

AD-630 278 Fld. 21/4, 21/2, 5/9, 19/6
CFSTI Prices: HC $7.60 MF $0.75
BARKER (JAMES J) CONSULTING ENGINEER JERICHO N Y
FUELS FOR SMALL ARMS NOISE SIMULATORS. DEVICE 3C65D.
Technical rept. for Mar-Jul 65,
by James J. Barker. Feb 66, 80p. Contract N61339-1491, NAVTRADEVCEN 1491-2

Unclassified report

Descriptors: (*Small arms, Noise), (*Fuels, Detonators), (*Noise, Simulators), (*Training devices, Fuels), Effectiveness, Ignition, Hydrogen, Simulation

Fuels better than acetylene or propane are desired. A survey of available fuels was made. No liquids are well suited. Gasoline, because of its ready availability, is the only liquid worth considering for development. The liquefied petroleum gases are not volatile enough. Gases make better fuels for the simulator because climatic changes effect them less. In simple tests, hydrogen worked with oxygen from a cylinder or with air from a small compressor. Manufactured gases high in hydrogen and carbon monoxide should be suitable. Natural gas is not recommended. The explosion chamber should be elongated and fitted with inserts to shorten the predetonation induction distance. Hydrogen is the recommended fuel. (Author)

AD-630 416 Fld. 21/4
CFSTI Prices: HC $1.00 MF $0.50
COATING AND CHEMICAL LAB ABERDEEN PROVING GROUND MD
SHELF STABILITY AND INHIBITING ABILITY OF GUM PREVENTIVE, GASOLINE.
Final rept.,
by Jules B. Counts. Mar 66, 25p. Rept. no. CCL-194,
Proj. da-1C024401A109,

Unclassified report

Descriptors: (*Gasoline, Fuel additives), Inhibition, Stability, Life expectancy, Fuels

The object was to evaluate the shelf stability and inhibiting ability of gum preventive compound meeting Federal Specification VV-G-800. Varying amounts of gum preventive compounds were added to combat gasoline and regular motor fuel and stored at ambient temperature in order to determine its inhibiting ability. The shelf stability of the concentrated gum preventive packaged in containers of various types and capacities was determined at 72 and 110F. Storage test results show that the gasoline gum preventive has satisfactory inhibiting ability and shelf stability for a minimum of 24 months. Four ounce screw top, tin lined type cans, sufficient for a single application is considered to be the best packaging medium for this compound. (Author)

AD-629 765 See Fld. 1/2

AD-629 780 See Fld. 19/1

21/5. JET AND GAS TURBINE ENGINES

AD-629 951 Fld. 21/5, 21/2
CFSTI Prices: HC $6.60 MF $0.75
HILLER AIRCRAFT CORP PALO ALTO CALIF
INVESTIGATION OF A RESONANT COMBUSTOR CONCEPT.
Summary rept.,
by George E. Heuer, and Raymond M. Lockwood. 30 Jan 60, 70p. Rept. no. ARD-253, Contract Nonr-2458 (00),

Unclassified report

Descriptors: (*Pulsejet engines, Combustion chambers), (*Combustion chambers, Pulsejet engines), Jet pumps, Fuel pumps, Design, Performance (Engineering), Thrust, Ramjet engines

The project is concerned with an attempt to take advantage of the pressure rise that occurs during resonant combustion, but to avoid the losses that have plagued the majority of resonant combustion systems during the blowback or flow reversal portion of the cycle. In order to avoid flow reversal losses, as well as to take advantage of a ram pressure rise (or compressor pressure rise), the resonant combustor was placed inside a ram shroud or duct which permits a bypass flow around the combustor. A large number of combustor air inlets were provided (between 80 and 100 inlets), which permitted submerging the inlets into the combustor shell, and thus reducing the external drag around the combustor and improving the combustor air inflow coefficient. The use of a large number of air inlets also contributed to a reduction of burning time, which was reflected in an unusually high operating frequency. Fuel was injected into each air inlet, in a jet pump arrangement. This feature permitted static (zero airspeed) starting and operation of the combustor when using gaseous fuels such as propane.

AD-630 272 Fld. 21/5
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
METHOD OF MEASURING THE TEMPERATURE FIELD OF A STREAM OF EXHAUST GASES,

by I. L. Frolovskii. 18 Feb 66, 4p. Rept. no. ftd-TT-65-1944,

Unclassified report

Unedited rough draft trans. of Patent (USSR) 169 826, appl. 890881/26-10, 25 Mar 64.

Descriptors: (*Exhaust gases, Temperature), (*Temperature, Measurement), (*Gas turbines, Exhaust gases), Thermocouples, Vortices, Patents, USSR

Object of the Invention: A method of measuring the temperature field of a stream of exhaust gases, for example, on the test stand of gas turbine engines, with the help of a thermocouple which has the distinguishing feature that for the purpose of improving the precision of the measurements and shortening the time spent on the test the thermocouple is set up between the engine and the exhaust system, the measuring of the temperature field is done in this section, and the results obtained are converted mathematically with the taking into account of the vortex in the gas stream. (Author)

AD-630 284 Fld. 21/5
CFSTI Prices: HC $2.60 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
LOSSES IN STAGE OF AXIAL TURBINE AT SPEEDS OF APPROACHING IN THE VICINITY OF THE SPEED OF SOUND,
by J. Camek, and O. Bunata. 18 Feb 66, 24p.
Rept. no. ftd-TT-65-1846,
TT 66-60816

Unclassified report

Unedited rough draft trans. of Vyzkumny a Zkusebni Letecky Ustav, Letnany. Zpravodaj (Czechoslovakia) n6 p9-15 1963.

Descriptor: (*Axial-flow turbines, Performance (Engineering)), (*Jet engines, Effectiveness), Sound, Velocity, Gas turbine blades, Gas flow, Czechoslovakia, Transonic flow, Heating

To reduce the weight and complexity, individual stages of avia gas turbines are plannned for speeds of sound. The effectiveness of stages should not decrease here. The causes are discussed of loss increases in blade rims at these velocities and mentioned are the requirements, which must be observed during the planning of blades. From the measurement results of dividing blade lattices are visual the difficulties, with which the preparation of blade lattices encounters with low losses when flowing at sonic speed and also given are ways for their elimination. (Author)

AD-630 330 Fld. 21/5
CFSTI Prices: HC $5.00 MF $1.00
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
RAMJET TECHNOLOGY. CHAPTER 7. FUEL SYSTEMS.
Technical memo.,
by W. E. Worley. Mar 66, 156p. Rept. no. TG-610-7,
Contract NOw-62-0604-c, Task X81S,

Unclassified report

Prepared in cooperation with the Bendix Mishawaka Div., Bendix Corp., Ind.

Descriptors: (*Ramjet engines, Fuel systems), (*Fuel systems, Ramjet engines), Fuel injection, Fuel pumps, Jet pumps, Control systems, Design, Velocity, Fuel tanks, Pressurization

The design and development of a fuel system for a ramjet engine is discussed. The fuel system, which supplies fuel to the combustion chamber in proper proportion to air flow and in a manner conducive to efficient burning, performs four functions: supply, pumping, regulation, and injection. (Author)

AD-629 786 **See Fld. 11/6**

AD-630 419 **See Fld. 13/10**

21/8.2 SOLID ROCKET MOTORS

AD-630 205 **See Fld. 14/2**

AD-630 206 **See Fld. 14/2**

AD-630 261 **See Fld. 14/2**

21/9. ROCKET PROPELLANTS

AD-629 780 **See Fld. 19/1**

AD-630 191 **See Fld. 5/1**

21/9.2 SOLID ROCKET PROPELLANTS

AD-630 409 **See Fld. 21/2**

Field 22-SPACE TECHNOLOGY

22/1. ASTRONAUTICS

AD-630 274 Fld. 22/1
CFSTI Prices: HC $1.10 MF $0.50
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
WE ARE EXPECTING NEW FLIGHTS.
4 Mar 66, 8p. Rept. no. FTD-TT-66-26,
TT 66-60811

Unclassified report

Unedited rough draft trans. from Leninskaya Smena (USSR) 24 Mar p1 1965.

Descriptors: (*Space flight, USSR), Astronautics

AD-629 980 **See Fld. 20/13**

22/2. SPACECRAFT

AD-629 756 Fld. 22/2, 4/1
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF RADIO AND ELECTRICAL ENGINEERING
DETECTING MICROMETEROIDS ACOUSTICALLY FROM ROCKETS,
by R. Wlochowicz. 15 Sep 65, 27p.
NRC 8736

Unclassified report

Availability: Published in Canadian Journal of Physics v44 p1-25 1966. Copies to DDC users only.

Descriptors: (*Meteors, Acoustic detectors), Sounding rockets, Instrumentation, Atmospheric sounding

Two models of acoustic micrometeoroid detectors were flown piggyback on several Canadian rockets, one of which was launched in the spring of 1963 and the others in the winter and fall of 1964 from the Churchill Rocket Range. The micrometeroid detecting systems and the calibration technique based on the elastic impact of polystyrene spheres are described. Responses recorded during six flights are presented and analyzed. The analysis is developed in detail to illustrate the uncertainties in interpreting the data and to establish qualitatively the accuracy of the results. Responses attributed to impacts of micrometeoroids are treated collectively. An average impact rate of 1.4/sq m sec and a threshold mass of 10 to the minus 11th power g at 30 km/sec are ascribed to the data. A high density of small particles is apparently indicated. Impact rates for successive 5-km intervals to a height of 167 km indicate a variation with height. Regions of increased activity, roughly double the average rate, are observed centered on the height intervals 145 to 150 km and 125 to 130 km. A region of slightly less activity exists near 90 km, and a sharply defined region appears at the 105 to 110 km interval. The relative stability of all or any of these active regions has yet to be established. (Author)

AD-630 036 Fld. 22/2, 11/3
CFSTI Prices: HC $2.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
TWO NEW COATINGS FOR SATELLITE TEMPERATURE CONTROL.
Technical memo.,
by Paul R. Schrantz. Dec 65, 25p. Rept. no. TG-758,
Contract NOw-62-06-04-c,

Unclassified report

Descriptors: (*Satellites (Artificial), Coatings), (*Coatings, Temperature control), Solar radiation, Thermal conductivity, Electrical resistance, Reflectivity, Space environmental conditions, Paints, Tests, Dielectrics, Blackbody radiation

The report describes in detail the preparation, properties, and qualification testing of two new coatings for use in satellites that are exposed to extraterrestrial solar irradiance. The first is a black coating, called APL Conductive Black No. 100, which was developed at The Applied Physics Laboratory for use on the DME-A satellite, launched in late 1965. The second coating is presently in the development stage and is produced by the application of a number of dielectric-coated second-surface silver mirrors to the surface of the satellite. Although this type of coating has not been selected for any particular APL satellite, it appears likely that it could result in a significant breakthrough in the field of stable low a/e (ratio of solar absorptance, a, to infrared emittance, e) coatings for use in extraterrestrial space. (Author)

AD-630 463 Fld. 22/2, 14/2
CFSTI Prices: HC $2.00 MF $0.50
AIR FORCE FLIGHT DYNAMICS LAB WRIGHT-PATTERSON AFB OHIO
DEVELOPMENT TEST SUMMARY IN SUPPORT OF X-20 ELEVON STRUCTURAL TEST PROGRAM.
Final rept., Jan-Jul 64,
by John C. Grogan. Jan 66, 31p. Rept. no. AFFDL-TR-65-191,
Proj. AF-1368, Task 136804,

Unclassified report

Descriptors: (*Elevons, Spacecraft), (*Test methods, Elevons), High-temperature research, Test facilities, Furnaces, Structure, Environmental tests

The contents of this report are oriented exclusively toward test procedures, test hardware and test techniques involving advanced type structures. It contains a general summary of significant results obtained during the development test program conducted in preparation for the X-20 Elevon Structural Test Program. (Author)

AD-630 469 Fld. 22/2, 11/2
CFSTI Prices: HC $3.60 MF $0.50
AIR FORCE FLIGHT DYNAMICS LAB WRIGHT-PATTERSON AFB OHIO
X-20 WINDOW TESTS.
Final rept., Feb-Apr 65,
by Murray N. England. Jan 66, 39p. Rept. no. AFFDL-TR-65-211,
Proj. AF-1368, Task 136802,

Unclassified report

Descriptors: (*Windshields, Aerospace craft), (*Glass, Windshields), (*Aerospace craft, Windshields), Space simulation chambers, Heat-resistant glass, Mechanical properties, Tests, Launching, Atmosphere entry, High-temperature research

This report describes two structural integrity tests of the X-20A high temperature side window. One test simulated the air leakage from the window during boost and the second test simulated the thermal cycle experienced during reentry. The outside window panel failed prematurely during the thermal cycle, apparently the result of excessive thermal gradients through the frame and a stress concentration caused by thermistor instrumentation leads passing through the frame and under the window seals. (Author)

AD-629 908 **See Fld. 13/8**

AD-630 073 **See Fld. 4/2**

AD-630 126 **See Fld. 4/1**

AD-630 142 **See Fld. 4/1**

22/3. SPACECRAFT TRAJECTORIES AND REENTRY

AD-630 034 Fld. 22/3, 17/3
CFSTI Prices: HC $1.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
ORBITAL ELEMENTS FROM DOPPLER TRACKING OF THREE SATELLITES,
by Robert R. Newton. Nov 63, 17p. Rept. no. TG-539.
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Satellite tracking systems, Doppler system), (*Doppler systems, Satellite tracking systems), Orbital trajectories, Satellites (Artificial), Position finding, Tables, Astronomical geodesics, Radio waves, Propagation

The orbitallements resulting from this tracking are of research interest in two different ways. First, their secular and long-term periodic perturbations can be analyzed to yield equations of condition connecting the zonal harmonics in the Earth's gravitational field. Second, because of the unique nature of the radio signals from these satellites, they have been used in studies of radio propagation through the ionosphere and troposphere, and in studies of the reflections of radio signals from the Earth's surface. The paper presents tables of orbital elements of these satellites which are adequate for either of these types of research. (Author)

AD-630 045 Fld. 22/3
CFSTI Prices: HC $1.60 MF $0.50
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
ORBIT PREDICTION.
Technical memo.,
by G. Gebel. Apr 65, 19p. Rept. no. TG-681.
Contract NOw-62-0604-c,
Unclassified report

Descriptors: (*Orbital trajectories, Mathematical prediction), Mathematical models, Errors, Satellites (Artificial)

The present method of predicting an orbit for the immediate future is described. A mathematical model of the expected along-track errors is proposed and studied to determine how modification of parameters affects orbit prediction. (Author)

AD-629 976 **See Fld. 12/1**

AD-630 366 **See Fld. 14/2**

AD-630 450 **See Fld. 20/4**

22/4. SPACECRAFT LAUNCH VEHICLES AND GROUND SUPPORT

AD-630 325 **See Fld. 5/1**

How To Use Indexes To TAB Portion Of

U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS

SUBJECT INDEX

The Subject Index is arranged alphabetically by asterisked descriptors from the document announcements in the TAB. Each announcement contains one or more asterisked descriptors which identify the main subjects of the report. The asterisked descriptor may or may not have a modifying descriptor appearing directly below the asterisked descriptor. Under each descriptor entry in the Subject Index appear the following items of information: annotation, AD number, and field/group. A typical subject index entry is shown below.

*ALUMINUM
GLASS TEXTILES
INVESTIGATION OF GLASS-
METAL COMPOSITE MATERIALS
AD-619 773 FLD. 11/7

PERSONAL AUTHOR INDEX

The Personal Author Index is arranged alphabetically by the last names of the authors of reports. When several report entries are given for one author, the entries are arranged numerically by AD number. Field/group and titles are also listed. Three asterisks serve as a separator between entries for reports under the same author. A typical personal author entry is shown below.

*CHASE, JOHN W.
* * *
THE LANTHANUM, EUROPIUM,
AND DYSPROSIUM CONTENTS OF
TWO TEKTITES
AD-619 828 FLD. 8/7
* * *
A PROCEDURE FOR GEOCHEMICAL
INTERPRETATION OF TERRESTRIAL
RARE-EARTH ABUNDANCE PATTERNS
AD-619 834 FLD. 8/7

CORPORATE AUTHOR-MONITORING AGENCY INDEX

The Corporate Author-Monitoring Agency Index is arranged alphabetically by corporate authors and monitoring agencies.

In the corporate author entry for each document are listed the originator of the report, the originator's report number, the title, AD number, and field/group. If the source has listed a monitoring agency in the report, the monitor acronym and monitor series number are given in parenthesis directly under the title. An IDEP (Interservice Data Exchange Program) report number is presented in the same way. A typical corporate author entry is shown on the next page.

214-537 O - 66 - 8

*AEROJET- GENERAL CORP AZUSA
CALIF

* * *

TR3015
STUDY OF THE REACTION
OF PENTABORANE WITH HYDRAZINE
AND SUBSTITUTED HYDRAZINES
(AFOSR 65-1058)
AD-619 513 FLD. 7/4

The three asterisks serve as a separator between entries for reports under the same corporate author.

When a report lists a monitoring agency, a corresponding entry is provided under the name of the monitoring agency, which appears in alphabetical order among the corporate author entries. In a monitoring agency entry, the report number is given above the title in place of the originator's report number. A typical monitoring agency entry is shown below.

*AIR FORCE OFFICE OF SCIENTIFIC
RESEARCH WASHINGTON D C

* * *

65-1058
STUDY OF THE REACTION
OF PENTABORANE WITH HYDRAZINE
AND SUBSTITUTED HYDRAZINES
AD-619 513 FLD. 7/4

CONTRACT INDEX

The Contract index is arranged alphanumerically by contract number. Within a contract grouping, each entry contains corporate author, series number (if any), monitor number (if any), AD number, and field/group.

When there are multiple document entries under one contract number, entries are arranged by AD number under each corporate author represented.

A contract entry may also contain a letter F, A, or S on the left-hand margin, indicating that the document is a Final, Annual, or Summary report. A typical contract entry is shown below.

*AF19 628 5167
LINCOLN LAB MASS INST OF TECH
LEXINGTON
(ESD TDR-65-315)
AD-619 580 FLD. 9/5
(ESD TDR-65-309)
AD-619 708 FLD. 3/1

REPORT NUMBER INDEX

The Report Number Index lists identifying numbers assigned either by the document originators or by the sponsors of the work described in the documents. The AD number and field/group location in TAB are given for each report number. If both the originator and the sponsor of a document have assigned identifying numbers, listings for both will appear in the respective alphanumeric positions.

In certain cases accession numbers are also given with the corresponding AD numbers and TAB locations; for instance, the IDEP (Interservice Data Exchange Program) reports and the CFSTI-TT reports (Technical Translations from the Clearinghouse for Federal Scientific and Technical Information).

CCL-183	
AD-620 154	FLD. 11/9
CRSR-203	
AD-620 250	FLD. 3/1
DPS-1677	
AD-469 558	FLD. 19/1A

AD-FIELD INDEX

The AD-Field Index is arranged numerically by AD number and lists the field/group where the full entry can be located in TAB.

SUBJECT INDEX

The fields/groups indicated here apply only to the Technical Abstract Bulletin Section (on white paper

•ABSORPTION SPECTRUM
SURFACE PROPERTIES
REPRINT: EFFECT OF CHARGED SURFACES ON THE OPTICAL ABSORPTION EDGE.
AD-630 184 FLD. 20/6

•ABSTRACTS
SCIENTIFIC RESEARCH
TRANSLATION OF RUSSIAN RESEARCH: PROTECTIVE STRUCTURES AND COMPONENTS: COMPILATION OF ABSTRACTS.
AD-630 328 FLD. 9/1

•ACCELEROMETERS
EXPERIMENTAL DESIGN
GRAVITY GRADIENT MEASUREMENTS.
AD-630 410 FLD. 14/2

•ACETOPHENONES
CHEMICAL REACTIONS
REPRINT: SOLVENT EFFECT IN THE REACTION OF BENZALDESOXYBENZOIN WITH PHOSPHORUS PENTACHLORIDE.
AD-629 837 FLD. 7/3

PHOTOLYSIS
REPRINT: PHOTOCHEMICAL DECOMPOSITION OF ALPHA-DIAZOACETOPHENONE IN HYDROXYLIC SOLVENTS.
AD-629 839 FLD. 7/3

•ACHIEVEMENT TESTS
TRAINING
EFFECT OF FORMAT AND DETAIL OF JOB PERFORMANCE AIDS IN PERFORMING SIMULATED TROUBLESHOOTING TASKS.
AD-629 992 FLD. 5/9

•ACOUSTIC EQUIPMENT
DIRECTION FINDING
BEARING ANGLE ESTIMATION OF ATMOSPHERIC SONIC PLANE WAVES USING GROUND ARRAYS.
AD-630 422 FLD. 17/1

•ACOUSTICS
AEROSOLS
ATTENUATION AND DISPERSION OF SOUND BY PARTICULATE RELAXATION PROCESSES.
AD-630 326 FLD. 20/1

ATMOSPHERE
BEARING ANGLE ESTIMATION OF ATMOSPHERIC SONIC PLANE WAVES USING GROUND ARRAYS.
AD-630 422 FLD. 17/1

COMPRESSIBLE FLOW
REPRINT: PHYSICAL ACOUSTICS.
AD-630 159 FLD. 20/1

CYLINDRICAL BODIES
NUMERICAL DISCUSSION OF CREEPING ACOUSTICAL WAVES AROUND CYLINDERS. SOUND SCATTERING BY ELASTIC CYLINDRICAL SHELLS.
AD-630 033 FLD. 20/1

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PATTERN RECOGNITION
ADAPTIVE PROGRAMMING TECHNIQUES FOR CIRCUIT DESIGN.
AD-629 766 FLD. 9/2

PHASED ARRAYS
ACTIVE ARRAY TECHNIQUE.
AD-630 472 FLD. 9/5

•ADAPTIVE SYSTEMS
COMPUTER LOGIC
REPRINT: AN ADAPTIVE NETWORK FOR PRODUCING REAL FUNCTIONS OF BINARY INPUTS.
AD-629 836 FLD. 9/2

PATTERN RECOGNITION
ELECTROCHEMICALLY ADAPTIVE SYSTEM FOR PATTERN RECOGNITION.
AD-629 896 FLD. 7/4

•AERODYNAMICS
EQUATIONS
OPTIMIZATION OF AERODYNAMIC EQUATIONS.
AD-630 268 FLD. 20/4

METEOROLOGICAL BALLOONS
MODIFICATION OF THE ROBIN METEOROLOGICAL BALLOON. VOLUME II. DRAG EVALUATIONS.
AD-629 779 FLD. 1/3

USSR
TRANSLATION OF RUSSIAN RESEARCH: AN INVESTIGATION OF PRESSURE DISTRIBUTION ON CERTAIN STARLIKE BODIES AT NEARLY 4M.
AD-630 168 FLD. 20/4

•AEROSOLS
SCINTILLATION
APPARENT DEPENDENCE OF TERRESTRIAL SCINTILLATION INTENSITY UPON ATMOSPHERIC HUMIDITY.
AD-630 117 FLD. 4/1

SOUND TRANSMISSION
ATTENUATION AND DISPERSION OF SOUND BY PARTICULATE RELAXATION PROCESSES.
AD-630 326 FLD. 20/1

•AEROSPACE CRAFT
WINDSHIELDS
X-20 (DYNA-SOAR) AEROSPACE CRAFT WINDOW TESTS.
AD-630 469 FLD. 22/2

•AGING(MATERIALS)
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COAGENTS FOR IMPROVING ELASTIC RECOVERY IN POLYESTER URETHANE ELASTOMERS.
AD-629 972 FLD. 11/10

•AGRICULTURE
PRODUCTION
HISTORICAL EXAMPLES OF ECOLOGICAL DISASTER. FAMINE IN RUSSIA 1921-22. FAMINE IN BECHUANALAND 1969.
AD-629 887 FLD. 6/6

•AIR
ION EXCHANGE
EXPERIMENTAL STUDIES ON HEAVY ION EXCHANGE IN AIR.
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AGENERALIZED ASYMPTOTIC METHOD FOR THE SOLUTION OF REACTING LAMINAR BOUNDARY LAYER FLOWS. THREE-DIMENSIONAL FLOW OF AIR AT CHEMICAL EQUILIBRIUM NEAR A STAGNATION POINT.
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•AIR FORCE
WAGES
APPLICATION OF LARGE-SCALE COMPUTERS TO AIR FORCE INFORMATION SYSTEMS FOR FINANCE AND PERSONNEL ASSIGNMENT.
AD-629 867 FLD. 9/2

•AIR FORCE PERSONNEL
COMPUTERS
APPLICATION OF LARGE-SCALE COMPUTERS TO AIR FORCE INFORMATION SYSTEMS FOR FINANCE AND PERSONNEL ASSIGNMENT.
AD-629 867 FLD. 9/2

•AIR FORCE PROCUREMENT
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CRITERIA FOR VALUE ENGINEERING: FEASIBILITY STUDY.
AD-630 207 FLD. 14/1

•AIR FORCE RESEARCH
CHEMISTRY
AFOSR CHEMISTRY REVIEW FOR FISCAL YEAR 1961.
AD-630 086 FLD. 7/2
AFOSR CHEMISTRY PROGRAM REVIEW FOR FISCAL YEAR 1998.
AD-630 109 FLD. 7/2
AFOSR CHEMISTRY PROGRAM REVIEW FOR FISCAL YEAR 1999.
AD-630 106 FLD. 7/2
AFOSR CHEMISTRY PROGRAM REVIEW FOR THE PERIOD 1 JAN 91 TO 1 JUL 99.
AD-630 107 FLD. 7/2
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AD-630 917 FLD. 20/10

•AF-AFOSR-292-64
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB
(AFOSR-69-2931)
AD-629 795 FLD. 12/1

•AF-AFOSR-321-63
KING'S COLL UNIV OF LONDON (ENGLAND)
(AFOSR-66-0382)
AD-630 231 FLD. 20/10

•AF-AFOSR-339-63
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATHEMATICS
(AFOSR-66-0009)
AD-630 396 FLD. 12/1

•AF-AFOSR-361-63

WINDSOR UNIV (ONTARIO) DEPT OF PHYSICS
(AFOSR-66-0384)
AD-630 216 FLD. 20/6

*AF-AFOSR-361-65
WINDSOR UNIV (ONTARIO) DEPT OF PHYSICS
(AFOSR-66-0400)
AD-629 818 FLD. 7/4

*AF-AFOSR-368-63
BRANDEIS UNIV WALTHAM MASS DEPT OF PHYSICS
(AFOSR-66-0437)
AD-630 322 FLD. 20/10
(AFOSR-66-0433)
AD-630 359 FLD. 20/8
(AFOSR-66-0442)
AD-630 444 FLD. 20/10

*AF-AFOSR-368-65
BRANDEIS UNIV WALTHAM MASS DEPT OF PHYSICS
(AFOSR-66-0431)
AD-630 210 FLD. 20/10
(AFOSR-66-0448)
AD-630 311 FLD. 20/10

*AF-AFOSR-385-63
BOSTON UNIV MASS DEPT OF PHYSICS
(AFOSR-66-0019)
AD-630 306 FLD. 20/10

*AF-AFOSR-400-64
MARYLAND UNIV COLLEGE PARK INST FOR FLUID DYNAMICS AND APPLIED MATHEMATICS
(AFOSR-65-2329)
AD-629 790 FLD. 12/1
(AFOSR-65-2111)
AD-629 791 FLD. 12/1
(AFOSR-65-2344)
AD-629 792 FLD. 12/1
(AFOSR-65-2325)
AD-629 793 FLD. 12/1
(AFOSR-65-2235)
AD-629 794 FLD. 12/1
(AFOSR-65-2114)
AD-630 208 FLD. 12/1

*AF-AFOSR-403-64
WESTERN RESERVE UNIV CLEVELAND OHIO CENTER FOR DOCUMENTATION AND COMMUNICATION RESEARCH
(AFOSR-65-2690)
AD-629 801 FLD. 9/2

*AF-AFOSR-440-65
FLORIDA STATE UNIV TALLAHASSEE DEPT OF PHYSICS
(AFOSR-66-0485)
AD-630 220 FLD. 20/8
(AFOSR-66-0483)
AD-630 228 FLD. 20/8
(AFOSR-66-0106)
AD-630 239 FLD. 18/4
(AFOSR-66-0105)
AD-630 240 FLD. 20/8
(AFOSR-66-0104)
AD-630 512 FLD. 20/8
PITTSBURGH UNIV PA DEPT OF PHYSICS
(AFOSR-66-0486)
AD-630 241 FLD. 20/8

*AF-AFOSR-469-64
STEVENS INST OF TECH HOBOKEN N J
(AFOSR-65-2133)
AD-629 799 FLD. 20/9
(AFOSR-65-2134)
AD-629 800 FLD. 20/9

*AF-AFOSR-470-64
PITTSBURGH UNIV PA DEPT OF CHEMISTRY
(AFOSR-65-2135)
AD-629 803 FLD. 7/3

*AF-AFOSR-476-64
UTAH UNIV SALT LAKE CITY DEPT OF CHEMISTRY
(AFOSR-65-2370)
AD-629 798 FLD. 7/4

*AF-AFOSR-492-64
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATHEMATICS
(AFOSR-65-2324)
AD-629 802 FLD. 8/2

*AF-AFOSR-493-64
DUKE UNIV DURHAM N C DEPT OF PHYSICS
(AFOSR-65-2137)
AD-629 796 FLD. 7/4
(AFOSR-65-2136)
AD-629 797 FLD. 7/4

*AF-AFOSR-496-65
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING
(AFOSR-65-2116)
AD-630 209 FLD. 20/14

*AF-AFOSR-500-64
MARYLAND UNIV COLLEGE PARK DEPT OF PHYSICS AND ASTRONOMY
(AFOSR-66-0439)
AD-630 229 FLD. 20/8
(AFOSR-66-0440)
AD-630 233 FLD. 20/10
(AFOSR-66-0444)
AD-630 320 FLD. 20/8

*AF-AFOSR508-64
BELFER GRADUATE SCHOOL OF SCIENCE YESHIVA UNIV NEW YORK
(AFOSR-66-0397)
AD-629 816 FLD. 20/10
(AFOSR-65-2782)
AD-629 819 FLD. 7/4
IMPERIAL COLL OF SCIENCE AND TECHNOLOGY LONDON (ENGLAND) DEPT OF MATHEMATICS
(AFOSR-65-2777)
AD-629 818 FLD. 20/8

*AF-AFOSR-509-64
BELFER GRADUATE SCHOOL OF SCIENCE YESHIVA UNIV NEW YORK
(AFOSR-65-2785)
AD-629 820 FLD. 20/10

*AF-AFOSR-519-64
MCMASTER UNIV HAMILTON (ONTARIO) DEPT OF METALLURGY AND METALLURGICAL ENGINEERING
(AFOSR-65-2236)
F AD-629 841 FLD. 11/6

*AF-AFOSR-529-64
NORTHWESTERN UNIV EVANSTON ILL DEPT OF CHEMISTRY
(AFOSR-65-2120)
AD-630 211 FLD. 7/4

*AF-AFOSR-526-64
KANSAS STATE UNIV MANHATTAN
(AFOSR-65-2668)
AD-629 856 FLD. 9/10

*AF-AFOSR-536-64
CASE INST OF TECH CLEVELAND OHIO DEPT OF PHYSICS
(AFOSR-65-2550)
AD-629 832 FLD. 20/12

*AF-AFOSR-556-64
ENRICO FERMI INST FOR NUCLEAR STUDIES UNIV OF CHICAGO ILL
(AFOSR-65-0827)
AD-629 893 FLD. 20/8

*AF-AFOSR-557-64
BOSTON UNIV MASS DEPT OF PHYSICS
(AFOSR-66-0385)
AD-629 805 FLD. 12/1

*AF-AFOSR-569-64
EVANS CHEMICAL LAB OHIO STATE UNIV COLUMBUS
(AFOSR-66-0320)
AD-629 837 FLD. 7/3
(AFOSR-66-0319)
AD-629 838 FLD. 7/3

*AF-AFOSR-571-64
MINNESOTA UNIV MINNEAPOLIS INST OF TECH
(AFOSR-65-2339)
AD-629 855 FLD. 12/2

*AF-AFOSR-580-64
MELLON INST PITTSBURGH PA
(AFOSR-66-0314)
AD-629 804 FLD. 7/3
(AFOSR-66-0315)
AD-629 809 FLD. 7/3
(AFOSR-66-0321)
AD-629 810 FLD. 7/3

*AF-AFOSR-589-64
NORTH CAROLINA UNIV CHAPEL HILL DEPT OF CHEMISTRY
(AFOSR-66-0301)
AD-629 807 FLD. 7/4
(AFOSR-65-2364)
AD-629 808 FLD. 7/4

*AF-AFOSR-590-64
WASHINGTON UNIV SEATTLE DEPT OF CHEMISTRY
(AFOSR-66-0306)
AD-629 806 FLD. 7/3

*AF-AFOSR-602-64
INDIANA UNIV BLOOMINGTON
(AFOSR-66-0409)
F AD-630 393 FLD. 7/4
INDIANA UNIV BLOOMINGTON DEPT OF CHEMISTRY
(AFOSR-66-0311)
AD-629 849 FLD. 7/4

*AF-AFOSR-606-64
MINNESOTA UNIV MINNEAPOLIS DEPT OF ELECTRICAL ENGINEERING
(AFOSR-65-2537)
AD-629 847 FLD. 20/12

*AF-AFOSR-610-64
CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF PHYSICS
(AFOSR-65-2538)
AD-629 821 FLD. 20/12

*AF-AFOSR-631-64
CALIFORNIA UNIV LA JOLLA
(AFOSR-66-0094)
AD-629 823 FLD. 11/6
(AFOSR-66-0053)
AD-629 824 FLD. 20/12
(AFOSR-65-2573)
AD-629 826 FLD. 20/12
(AFOSR-65-2533)
AD-629 828 FLD. 20/12
CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF PHYSICS
(AFOSR-65-2546)
AD-629 830 FLD. 11/6

*AF-AFOSR-633-64
ILLINOIS UNIV URBANA DEPT OF MINING METALLURGICAL AND PETROLEUM ENGINEERING
(AFOSR-65-2594)
AD-629 868 FLD. 20/8

*AF-AFOSR-647-64
CARNEGIE INST OF TECH PITTSBURGH PA DEPT OF MATHEMATICS
(AFOSR-65-2152)
AD-629 866 FLD. 12/1

*AF-AFOSR-662-64
FLORIDA STATE UNIV TALLAHASSEE INST OF MOLECULAR BIOPHYSICS
(AFOSR-65-2859)
AD-629 845 FLD. 6/1

*AF-AFOSR-667-64

STATE UNIV OF NEW YORK STONY BROOK
COLL OF ENGINEERING
(AFOSR-65-2153)
AD-629 898 FLD. 6/1

•AF-AFOSR-669-64
PENNSYLVANIA STATE UNIV UNIVERSITY PARK MATERIALS SCIENCE LAB
(AFOSR-65-2126)
AD-629 893 FLD. 11/6

•AF-AFOSR-694-64
CALIFORNIA UNIV RIVERSIDE
(AFOSR-65-2131)
AD-630 397 FLD. 12/1

•AF-AFOSR-695-64
WAYNE STATE UNIV DETROIT MICH
DEPT OF PHYSICS
(AFOSR-66-0079)
AD-629 858 FLD. 20/3

•AF-AFOSR-698-65
CALIFORNIA UNIV SANTA BARBARA
DEPT OF MATHEMATICS
(AFOSR-65-2390)
AD-629 817 FLD. 12/1
(AFOSR-65-2100)
AD-630 516 FLD. 12/1

•AF-AFOSR-709-64
SOUTHWEST CENTER FOR ADVANCED STUDIES DALLAS TEX
(AFOSR-66-0379)
AD-630 236 FLD. 20/10

•AF-AFOSR-710-64
CALIFORNIA UNIV LOS ANGELES INST OF GEOPHYSICS AND PLANETARY PHYSICS
(AFOSR-65-2132)
AD-629 822 FLD. 8/11

•AF-AFOSR-713-64
BELFER GRADUATE SCHOOL OF SCIENCE YESHIVA UNIV NEW YORK
(AFOSR-66-0396)
AD-629 871 FLD. 20/10
(AFOSR-66-0395)
AD-630 221 FLD. 20/10

•AF-AFOSR-722-65
CALIFORNIA UNIV SAN DIEGO LA JOLLA
DEPT OF MATHEMATICS
(AFOSR-65-2636)
AD-629 894 FLD. 20/12

•AF-AFOSR-729-65
TEXAS UNIV AUSTIN
(AFOSR-65-2771)
AD-629 842 FLD. 3/2

•AF-AFOSR-731-65
STANFORD UNIV CALIF DEPT OF MATERIALS SCIENCE
(AFOSR-66-0239)
AD-629 890 FLD. 20/12

•AF-AFOSR-751-65
CASE INST OF TECH CLEVELAND OHIO
(AFOSR-65-2686)
AD-629 876 FLD. 9/2

•AF-AFOSR-770-65
CORNELL UNIV ITHACA N Y DEPT OF ENGINEERING PHYSICS
(AFOSR-66-0052)
AD-629 839 FLD. 11/6

•AF-AFOSR-781-65
CHICAGO UNIV ILL INST FOR THE STUDY OF METALS
(AFOSR-66-0322)
AD-629 811 FLD. 7/4
(AFOSR-66-0323)
AD-629 812 FLD. 7/4
(AFOSR-66-0310)
AD-629 813 FLD. 7/4

•AF-AFOSR-793-65
MINNESOTA UNIV MINNEAPOLIS SCHOOL OF PHYSICS
(AFOSR-65-2772)
AD-629 827 FLD. 20/4

•AF-AFOSR-820-65
OHIO STATE UNIV COLUMBUS DEPT OF CHEMISTRY
(AFOSR-66-0296)
AD-629 833 FLD. 7/5
(AFOSR-66-0297)
AD-629 834 FLD. 7/5
(AFOSR-66-0298)
AD-629 835 FLD. 7/5

•AF-AFOSR-859-65
RICE UNIV HOUSTON TEX DEPT OF SPACE SCIENCE
(AFOSR-66-0432)
AD-630 449 FLD. 3/2

•AF-AFOSR-886-65
STANFORD UNIV CALIF DEPT OF GENETICS
(AFOSR-65-2831)
AD-629 829 FLD. 6/1

•AF-AFOSR-903-65
SOUTHWEST CENTER FOR ADVANCED STUDIES DALLAS TEX
(AFOSR-66-0061)
AD-630 310 FLD. 20/10
(AFOSR-66-0062)
AD-630 321 FLD. 20/10
(AFOSR-66-0471)
AD-630 384 FLD. 20/10

•AF-AFOSR-929-65
WASHINGTON UNIV SEATTLE
(AFOSR-66-0378)
AD-629 831 FLD. 20/13

•AF-AFOSR-948-65
KENTUCKY UNIV LEXINGTON DEPT OF ELECTRICAL ENGINEERING
(AFOSR-65-1991)
AD-630 136 FLD. 9/5

•AF-AFOSR-969-65
PRINCETON UNIV N J
(AFOSR-65-2663)
AD-629 829 FLD. 5/10

•AF-EOAR-13-65
VON KARMAN INST FOR FLUID DYNAMICS RHODE-SAINT-GENESE (BELGIUM)
(AFOSR-66-0575)
A AD-629 779 FLD. 14/2

•AF-EOAR-21-63
UNIVERSITY COLL CORK (EIRE)
(AFOSR-66-0211)
AD-630 498 FLD. 20/11

•AF-EOAR-42-65
PISA UNIV (ITALY)
(AFOSR-66-0267)
AD-630 219 FLD. 12/1

•AF-EOAR-46-64
IMPERIAL COLL OF SCIENCE AND TECHNOLOGY LONDON (ENGLAND) DEPT OF PHYSICS
(AFOSR-66-0103)
AD-630 138 FLD. 20/8
(AFOSR-66-0102)
AD-630 140 FLD. 20/10

•AF-EOAR-46-65
UNIVERSITY COLL CORK (EIRE)
(AFOSR-66-0377)
AD-630 223 FLD. 9/2

•AF-EOAR-52-64
BRUSSELS UNIV (BELGIUM)
(AFOSR-66-0392)
AD-630 141 FLD. 7/4

•AF-EOAR-58-63
TECHNION - ISRAEL INST OF TECH HAIFA DEPT OF AERONAUTICAL ENGINEERING
SCIENTIFIC-4
(AFOSR-66-0613)
AD-630 392 FLD. 20/11

•AF-EOAR-62-63
UNIVERSITY COLL CORK (EIRE)
(AFOSR-66-0211)
AD-630 498 FLD. 20/11

•AF-EOAR-80-63
UNIVERSITY COLL DUBLIN (EIRE)
(AFOSR-66-0455)
AD-630 139 FLD. 9/1

•AF EOAR-82-65
LOUVAIN UNIV (BELGIUM) LAB OF INORGANIC CHEMISTRY
(ARL-65-229)
AD-630 390 FLD. 21/2

•AROD-2871-E
IOWA UNIV IOWA CITY INST OF HYDRAULIC RESEARCH
REPRINT-209
AD-630 018 FLD. 20/4

•ARPA ORDER-92
NORTHEASTERN UNIV BOSTON MASS
DEPT OF ELECTRICAL ENGINEERING
SCIENTIFIC-1
(AFCRL-68-732)
AD-629 994 FLD. 20/14

•ARPA ORDER-189-61
RAND CORP SANTA MONICA CALIF
RM-4196-ARPA
AD-630 316 FLD. 6/16
RM-4898-ARPA
AD-630 422 FLD. 17/1

•ARPA ORDER-292
LAMONT GEOLOGICAL OBSERVATORY PALISADES N Y
SCIENTIFIC-6
(AFCRL-66-121)
AD-630 101 FLD. 8/11

•ARPA ORDER-299
MONSANTO RESEARCH CORP EVERETT MASS BOSTON LAB
MRB-300907
AD-629 886 FLD. 7/5

•ARPA ORDER-306-62
LITTON PRECISION PRODUCTS INC
MORRIS PLAINS N J AIRTRON DIV
S AD-630 239 FLD. 20/2

•ARPA ORDER-317-62
UTAH UNIV SALT LAKE CITY DEPT OF CHEMICAL ENGINEERING
(AFOSR-66-0606)
F AD-630 409 FLD. 21/2

•ARPA ORDER-318-62
STANFORD RESEARCH INST MENLO PARK CALIF
FMU-8195
AD-629 992 FLD. 11/2

•ARPA ORDER-455
HARVARD UNIV CAMBRIDGE MASS DIV OF ENGINEERING AND APPLIED PHYSICS
F AD-630 452 FLD. 20/12

•ARPA ORDER-512
LINCOLN LAB MASS INST OF TECH LEXINGTON
TN-1966-7
(ESD-TDR-66-22)
AD-629 968 FLD. 12/1
JA-2969
(ESD-TDR-66-27)
AD-630 766 FLD. 14/2

•ARPA ORDER-629
TELEDYNE INDUSTRIES INC ALEXANDRIA VA EARTH SCIENCES DIV
SDL-191
AD-630 919 FLD. 8/11

•ARPA ORDER-693
SPERRY GYROSCOPE CO GREAT NECK N Y
RADIATION DIV
RD-5291-0680-VOL-2
(AFCRL-65-865-VOL-2)
AD-630 049 FLD. 9/5

•AS-5-298
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
TG-743
AD-630 035 FLD. 20/10
TG-739
AD-630 037 FLD. 20/10

•AT(11-1)-1198
ILLINOIS UNIV URBANA DEPT OF MINING METALLURGICAL AND PETROLEUM ENGINEERING
(AFOSR-65-2594)
AD-629 868 FLD. 20/8

•AT(11-1)-GEN-10
CALIFORNIA UNIV LOS ANGELES DEPT OF ENGINEERING
66-19
AD-630 939 FLD. 9/2

•AT(49-2)-1167
NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF
USNRDL-TR-934
AD-630 302 FLD. 18/2

•AT(49-5)-2110
NAVAL RESEARCH LAB WASHINGTON D C
NRL-6349
AD-629 881 FLD. 18/10

•DA-01-021-AMC-11928(Z)
BROWN ENGINEERING CO INC
HUNTSVILLE ALA RESEARCH LABS
TN-R-184
AD-630 294 FLD. 20/4

•DA-11-022-509-ORD-3300
BOSTROM RESEARCH LABS MILWAUKEE WIS
F AD-630 012 FLD. 6/19

•DA-11-070-AMC-852(M)
REACTION MOTORS DIV THIOKOL CHEMICAL CORP DENVILLE N J
RDM-5069-Q4
AD-629 891 FLD. 11/10

•DA-18-001-AMC-707(X)
J G ENGINEERING RESEARCH ASSOCIATES BALTIMORE MD
TR-6
AD-630 269 FLD. 20/11

•DA-19-020-AMC-0210
AVCO EVERETT RESEARCH LAB EVERETT MASS
AMP-184
AD-630 900 FLD. 7/4

•DA-19-020-AMC-02694(M)
CHEMICAL CORP SPRINGFIELD MASS
(SA-TR-18-1099)
AD-629 912 FLD. 11/11

•DA-19-066-AMC-184(X)
GENERAL ELECTRIC CO PHILADELPHIA PA MISSILE AND SPACE DIV
(AMRA-CR-65-01/4)
F AD-630 359 FLD. 11/4

•DA-23-072-ORD-1969
TEXAS UNIV AUSTIN
AD-630 073 FLD. 4/2

•DA-28-043-AMC-00073(E)
ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB
R-281
AD-630 029 FLD. 9/4
R-282
AD-630 030 FLD. 9/2

•DA-28-043-AMC-00218(E)
STANFORD RESEARCH INST MENLO PARK CALIF
FMU-5195
AD-629 942 FLD. 11/2

•DA-28-043-AMC-00379(E)
ELECTRONIC DEFENSE LABS SYLVANIA ELECTRONIC SYSTEMS-WEST MOUNTAIN VIEW CALIF
EDL-M859
AD-629 889 FLD. 9/6
EDL-M889
AD-629 890 FLD. 9/1
EDL-M888
AD-629 930 FLD. 9/1

•DA-28-043-AMC-00443(E)
MIAMI UNIV CORAL GABLES FLA INST OF MARINE SCIENCE
10
AD-629 952 FLD. 4/2

•DA-28-043-AMC-01204(E)
MOTOROLA INC SCOTTSDALE ARIZ MILITARY ELECTRONICS DIV
AD-629 892 FLD. 17/9

•DA-28-043-AMC-01279(E)
UTAH UNIV SALT LAKE CITY MICROWAVE DEVICE AND PHYSICAL ELECTRONICS LAB
(ECOM-TR-01279-1)
AD-629 909 FLD. 20/14

•DA-28-043-AMC-01313(E)
HUGHES AIRCRAFT CO FULLERTON CALIF
FR-65-10-252
(ECOM-01313-2)
AD-629 948 FLD. 9/1

•DA-28-043-AMC-01420(E)
DELCO RADIO DIV GENERAL MOTORS CORP KOKOMO IND
(ECOM-01420-2)
AD-630 394 FLD. 9/1

•DA-28-043-AMC-01520(E)
MARTIN CO BALTIMORE MD
(ECOM-01420-1)
AD-630 349 FLD. 9/1

•DA-30-069-AMC-649(R)
CORNELL AERONAUTICAL LAB INC BUFFALO N Y
CAL-BB-1994-S-1
F AD-629 782 FLD. 20/4
CAL-BB-1994-S-2
F AD-629 783 FLD. 20/4

•DA-31-124-ARO(D)-47
MASSACHUSETTS INST OF TECH CAMBRIDGE CORROSION LAB
(AROD-2841;6)
AD-630 071 FLD. 11/6

•DA-31-124-ARO(D)-100-34
MARTIN CO ORLANDO FLA
AD-630 131 FLD. 13/8

•DA-31-124-ARO(D)-124
DUNHAM LAB YALE UNIV NEW HAVEN CONN
(AROD-4313:9)
AD-630 067 FLD. 14/2

•DA-31-124-ARO(D)-129
JOINT INST FOR LABORATORY ASTROPHYSICS BOULDER COLO
AD-630 157 FLD. 7/4

•DA-31-124-ARO(D)-182
TULANE UNIV NEW ORLEANS LA DEPT OF CHEMISTRY
(AROD-4979:8)
AD-630 072 FLD. 7/5

•DA-31-124-ARO(D)-298
RIAS INC BALTIMORE MD
(AROD-5023:3)
AD-630 080 FLD. 11/6

•DA-31-124-ARO(D)-284
MICHIGAN UNIV ANN ARBOR DEPT OF CHEMISTRY
(AROD-5092:1)
AD-630 054 FLD. 7/3
(AROD-5092:5)
AD-630 055 FLD. 7/4
(AROD-5092:9)
AD-630 057 FLD. 7/3
(AROD-5092:7)
AD-630 058 FLD. 14/2
(AROD-5092:8)
AD-630 059 FLD. 7/4

•DA-31-124-ARO(D)-291
MINNESOTA UNIV MINNEAPOLIS DEPT OF ELECTRICAL ENGINEERING
(AROD-5117:1)
AD-630 188 FLD. 9/1

•DA-31-124-ARO(D)-320
CORNELL UNIV ITHACA N Y DEPT OF CHEMISTRY
(AROD-4890:3)
AD-630 075 FLD. 7/2

•DA-31-124-ARO(D)-331
OPERATIONS RESEARCH CENTER UNIV OF CALIF BERKELEY
ORC-65-18
AD-630 119 FLD. 12/2

•DA-31-124-ARO(D)-369
COURANT INST OF MATHEMATICAL SCIENCES NEW YORK UNIV N Y
IMM-NYU-346
AD-630 506 FLD. 20/6

•DA-33-019-ORD-722
BATTELLE MEMORIAL INST COLUMBUS OHIO
AD-630 113 FLD. 11/6
AD-630 129 FLD. 11/6

•DA-36-039-AMC-00028(E)
MINNESOTA UNIV MINNEAPOLIS
ELECTRON TUBE RESEARCH LAB
23
AD-629 781 FLD. 9/3

•DA-36-039-AMC-01460(E)
SPRAGUE ELECTRIC CO NORTH ADAMS MASS
AD-630 437 FLD. 9/1

•DA-36-039-AMC 01477(E)
SPERRY MICROWAVE ELECTRONICS CO CLEARWATER FLA
AD-630 317 FLD. 9/1

•DA-36-039-AMC-03200(E)
MASSACHUSETTS INST OF TECH CAMBRIDGE
AD-630 493 FLD. 5/7
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
AD-630 062 FLD. 7/4
AD-630 159 FLD. 20/1
AD-630 488 FLD. 6/3
AD-630 489 FLD. 9/2
AD-630 494 FLD. 9/4
AD-630 495 FLD. 7/4
AD-630 496 FLD. 17/2
AD-630 497 FLD. 20/5
AD-630 498 FLD. 7/4
AD-630 499 FLD. 7/4
AD-630 500 FLD. 9/5
AD-630 501 FLD. 7/4
AD-630 502 FLD. 6/3
AD-630 503 FLD. 20/5
AD-630 504 FLD. 20/5

•DA-36-039-AMC-03621(E)
SPRAGUE ELECTRIC CO NORTH ADAMS MASS
AD-630 252 FLD. 9/1
AD-630 253 FLD. 9/1

•DA-36-039-AMC-03625(E)
HAMILTON STANDARD DIV UNITED AIRCRAFT CORP WINDSOR LOCKS CONN

EBR-183
AD-630 001 FLD. 13/8

•DA-36-039-AMC-03629(E)
PIEZO CRYSTAL CO CARLISLE PA
AD-629 913 FLD. 9/1

•DA-36-039-AMC-06159(E)
SYLVANIA ELECTRIC PRODUCTS INC
WOBURN MASS SEMICONDUCTOR DIV
AD-630 195 FLD. 9/1
AD-630 196 FLD. 9/1

•DA-36-039-AMC-06161(E)
MOTOROLA INC PHOENIX ARIZ
SEMICONDUCTOR PRODUCTS DIV
G-16
AD-629 893 FLD. 9/1

•DA-36-039-SC-87197
STANFORD RESEARCH INST MENLO PARK
CALIF
RM-8
AD-630 091 FLD. 9/5
RM-9
AD-630 092 FLD. 9/1
RM-10
AD-630 093 FLD. 9/5
RM-11
AD-630 094 FLD. 9/1

•DA-99-009-AMC-9984(T)
RADIO CORP OF AMERICA LANCASTER PA
DIRECT ENERGY CONVERSION DEPT
(ERDL-998T-1)
AD-629 762 FLD. 10/2

•DA-99-009-AMC-1563(T)
INSTITUTE OF MODERN LANGUAGES INC
WASHINGTON D C
(AERDL-T-1822-66)
AD-630 267 FLD. 12/1

•DA-99-177-AMC-112(T)
WESTERN CO OF NORTH AMERICA DALLAS
TEX RESEARCH DIV
F AD-629 769 FLD. 1/2

•DA-99-188-ARO-2
HUMAN RESOURCES RESEARCH OFFICE
GEORGE WASHINGTON UNIV
ALEXANDRIA VA
1-66
AD-630 984 FLD. 5/9

•DA-99-193-MD-2030
VANDERBILT UNIV NASHVILLE TENN
AD-630 199 FLD. 6/15

•DA-ARO(D)-31-124-G249
CALIFORNIA UNIV LOS ANGELES DEPT
OF CHEMISTRY
(AROD-3299:5)
AD-630 007 FLD. 7/3
(AROD-3299:6)
AD-630 008 FLD. 7/3
(AROD-3299:7)
AD-630 009 FLD. 7/3

•DA-ARO(D)-31-124-G337
STANFORD UNIV CALIF DEPT OF
PHYSICS
(AROD-3269:27)
F AD-630 092 FLD. 20/8
(AROD-3269:20)
AD-630 084 FLD. 20/8

•DA-ARO(D)-31-124-G374
DUKE UNIV DURHAM N C DEPT OF
PHYSICS
(AROD-3824:4)
AD-629 943 FLD. 20/12
(AROD-3824:1)
AD-629 944 FLD. 20/12
(AROD-3824:3)
AD-629 975 FLD. 20/8

•DA-ARO(D)-31-124-G413
CALIFORNIA UNIV LOS ANGELES DEPT
OF CHEMISTRY
(AROD-3953:2)
AD-630 006 FLD. 7/2

•DA-ARO(D)-31-124-G461
WASHINGTON UNIV SEATTLE DEPT OF
CHEMISTRY
(AROD-2441:14)
AD-630 158 FLD. 7/9

•DA-ARO(D)-31-124-G-495
MASSACHUSETTS INST OF TECH
CAMBRIDGE DEPT OF CHEMISTRY
(AROD-2832:26)
AD-630 004 FLD. 7/3

•DA-ARO(D)-31-124-G499
CALIFORNIA UNIV LOS ANGELES
(AROD-1517:68)
AD-630 100 FLD. 12/1

•DA-ARO(D)-31-124-G821
SYRACUSE UNIV N Y STATE UNIV COLL
OF FORESTRY
(AROD-4617:3)
AD-630 000 FLD. 7/9

•DA-ARO(D)-31-124-G982
ILLINOIS UNIV URBANA GASEOUS
ELECTRONICS LAB
SCIENTIFIC-2
(AROD-4832:7)
AD-630 074 FLD. 20/9

•DA-ARO(D)-31-124-G816
CHICAGO UNIV ILL DEPT OF
CHEMISTRY
(AROD-5107:4)
AD-630 002 FLD. 7/9

•DA-ARO(D)-31-124-G669
MICHIGAN UNIV ANN ARBOR
COMMUNICATION SCIENCES PROGRAM
03105-43-T
AD-630 257 FLD. 9/2

•DA-ARO(D)-31-124-G720
WESTERN RESERVE UNIV CLEVELAND
OHIO DEPT OF CHEMISTRY
(AROD-5838:1)
AD-630 102 FLD. 7/3

•DA-MD-49-193-63-G101
ARMED FORCES INST OF PATHOLOGY
WASHINGTON D C
AD-630 385 FLD. 6/8

•DRB-9501-32
SASKATCHEWAN UNIV SASKATOON DEPT
OF ELECTRICAL ENGINEERING
AD-629 994 FLD. 9/1

•DRB-9401-29
WATERLOO UNIV (ONTARIO)
AD-629 949 FLD. 9/10

•NIPR-966-63
MOUNT AUBURN RESEARCH ASSOCIATES
INC CAMBRIDGE MASS
(AFCRL-ERP-167)
AD-629 985 FLD. 8/14

•N5ORI-98
TUFTS UNIV MEDFORD MASS INST FOR
PSYCHOLOGICAL RESEARCH
(NTDC-58-2-4)
AD-629 759 FLD. 5/10

•N122(61796)29567 (PMR)
GCA TECHNOLOGY DIV GCA CORP
BEDFORD MASS
F AD-630 205 FLD. 14/2
F AD-630 206 FLD. 14/2
F AD-630 261 FLD. 14/2

•N196-96781
PENNSALT CHEMICALS CORP
PHILADELPHIA PA
AD-630 252 FLD. 11/9

•N161-26236
PENNSYLVANIA MILITARY COLL CHESTER
(MEL-37/66)
AD-629 789 FLD. 20/11

•N228-(62479)63921
STANFORD RESEARCH INST MENLO PARK
CALIF
AD-629 784 FLD. 15/2

•N600(61933)61992
WESTINGHOUSE ELECTRIC CORP LIMA
OHIO AEROSPACE ELECTRICAL DIV
AD-630 171 FLD. 10/2

•N600(61933)62798
MINNESOTA MINING AND MFG CO ST
PAUL
AD-630 041 FLD. 10/2

•N600(61933)63218
GENERAL ELECTRIC CO SCHENECTADY N
Y MATERIALS AND PROCESSES LAB
(MEL-131-66)
F AD-629 786 FLD. 11/6

•N61339-1341
HUMAN SCIENCES RESEARCH INC MCLEAN
VA
(NAVTRADEVCEN-1341-1)
F AD-630 312 FLD. 5/9

•N61339-1491
BARKER (JAMES J) CONSULTING
ENGINEER JERICHO N Y
(NAVTRADEVCEN-1491-2)
AD-630 278 FLD. 21/9

•N61339-1499
SYLVANIA ELECTRONIC SYSTEMS-EAST
NEEDHAM MASS
(NAVTRADEVCEN-1499-1)
F AD-630 268 FLD. 20/9

•N62998-2992
BERLIN TOWING TANK (WEST GERMANY)
F AD-630 089 FLD. 20/11

•N62998-3391
BATTERSEA COLL OF TECHNOLOGY
LONDON (ENGLAND)
F AD-630 990 FLD. 13/8

•N62998-3928
NUFFIELD RADIO ASTRONOMY LABS UNIV
OF MANCHESTER MACCLESFIELD
(ENGLAND)
AD-630 981 FLD. 3/2
AD-630 982 FLD. 3/2

•N62998-4119
ABERDEEN UNIV (SCOTLAND)
(NAVTRADEVCEN-4119-1)
F AD-630 260 FLD. 5/9

•N62998-4297
JOINT INST FOR LABORATORY
ASTROPHYSICS BOULDER COLO
AD-630 197 FLD. 7/9
QUEEN'S UNIV BELFAST (NORTHERN
IRELAND) DEPT OF APPLIED
MATHEMATICS
AD-630 010 FLD. 7/9
AD-630 196 FLD. 12/1

•N62998-4359
HEBREW UNIV JERUSALEM (ISRAEL)
DEPT OF MATHEMATICS
RM-18
AD-630 047 FLD. 12/2

•NASR-179
PITTSBURGH UNIV PA
TR-20
AD-630 218 FLD. 9/1

•NIH-NB-09210
STANFORD RESEARCH INST MENLO PARK
CALIF
AD-630 179 FLD. 6/16

•NOBSR-93424
INC MAGNETICS CORP BESTBURY N Y
AD-629 990 FLD. 13/1

•NOBSR-95080
MSI ELECTRONICS INC RICHMOND HILL N Y
AD-630 050 FLD. 20/6

•NONR-220(47)
CALIFORNIA INST OF TECH PASADENA
AD-630 426 FLD. 18/8

•NONR-220(58)
CALIFORNIA INST OF TECH PASADENA DIV OF ENGINEERING AND APPLIED SCIENCE
TR-4
AD-630 290 FLD. 20/11
TR-5
AD-630 291 FLD. 20/11

•NONR-222(83)
OPERATIONS RESEARCH CENTER UNIV OF CALIF BERKELEY
ORC-65-18
AD-630 119 FLD. 12/2
ORC-66-1
AD-630 120 FLD. 12/2

•NONR-225(46)
STANFORD UNIV CALIF DEPT OF PHYSIOLOGY
AD-629 995 FLD. 6/16

•NONR-225(50)
STANFORD UNIV CALIF INST FOR MATHEMATICAL STUDIES IN THE SOCIAL SCIENCES
TR-140
AD-630 487 FLD. 9/3

•NONR-225(77)
STANFORD UNIV CALIF DEPT OF INDUSTRIAL ENGINEERING
TR-5
AD-630 197 FLD. 13/8

•NONR-228(19)
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF BIOLOGICAL SCIENCES
AD-630 395 FLD. 6/13

•NONR-233(52)
CALIFORNIA UNIV LOS ANGELES DEPT OF ENGINEERING
66-14
AD-630 439 FLD. 9/2

•NONR-233(88)
CALIFORNIA UNIV LOS ANGELES DEPT OF PHYSICS
AD-630 081 FLD. 20/10
AD-630 083 FLD. 20/12

•NONR-266(89)
COLUMBIA UNIV NEW YORK COLL OF PHYSICIANS AND SURGEONS
AD-629 998 FLD. 13
AD-630 514 FLD. 6/13

•NONR-285(49)
NEW YORK UNIV N Y DEPT OF PHYSICS
F AD-630 172 FLD. 7/4

•NONR-401(38)
CORNELL UNIV ITHACA N Y LAB OF ATOMIC AND SOLID STATE PHYSICS
TR-11
AD-630 484 FLD. 20/12
KORAD CORP SANTA MONICA CALIF
AD-630 455 FLD. 20/9

•NONR-401(45)
CORNELL UNIV ITHACA N Y
TR-4
AD-630 082 FLD. 8/10

•NONR-404(10)
RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF PSYCHOLOGY
TR-19
AD-630 061 FLD. 5/11

•NONR-479(11)
VIRGINIA UNIV CHARLOTTESVILLE RESEARCH LABS FOR THE ENGINEERING SCIENCES
MS-3931-102-66U
AD-629 903 FLD. 11/6

•NONR-551(16)
PENNSYLVANIA UNIV PHILADELPHIA DEPT OF PHYSIOLOGY
AD-630 053 FLD. 6/16
AD-630 096 FLD. 6/3

•NONR-562(37)
BROWN UNIV PROVIDENCE R I DIV OF ENGINEERING
S AD-630 326 FLD. 20/1

•NONR-562(40)
BROWN UNIV PROVIDENCE R I DIV OF APPLIED MATHEMATICS
TR-1
AD-630 486 FLD. 20/11

•NONR-591(21)
RENSSELAER POLYTECHNIC INST TROY N Y
TR-1
AD-630 019 FLD. 20/12

•NONR-595(21)
MARYLAND UNIV COLLEGE PARK DEPT OF PSYCHOLOGY
AD-630 177 FLD. 5/10

•NONR-595(22)
MARYLAND UNIV COLLEGE PARK INST FOR FLUID DYNAMICS AND APPLIED MATHEMATICS
BN-437
AD-629 888 FLD. 20/13

•NONR-624(06)
PITTSBURGH UNIV PA
TR-20
AD-630 215 FLD. 4/1

•NONR-624(14)
PITTSBURGH UNIV PA GRADUATE SCHOOL OF BUSINESS
TR-11
AD-630 314 FLD. 5/10

•NONR-710(24)
SAINT ANTHONY FALLS HYDRAULIC LAB UNIV OF MINNESOTA MINNEAPOLIS
TECHNICAL PAPER-52-B
F AD-630 353 FLD. 20/4
TECHNICAL PAPER-54-B
F AD-630 354 FLD. 13/10

•NONR-710(37)
MINNESOTA UNIV MINNEAPOLIS DEPT OF ELECTRICAL ENGINEERING
AD-630 218 FLD. 20/9
AD-630 219 FLD. 7/4
MINNESOTA UNIV MINNEAPOLIS PLASMA PHYSICS LAB
AD-630 123 FLD. 20/3

•NONR-839(32)(FBM)
POLYTECHNIC INST OF BROOKLYN N Y
PIBAL-911
AD-630 019 FLD. 11/9

•NONR-1141(09)
CASE INST OF TECH CLEVELAND OHIO
(AFOSR-65-2686)
AD-629 836 FLD. 9/2

•NONR-1224(21)
MICHIGAN UNIV ANN ARBOR COMMUNICATION SCIENCES PROGRAM
03105-43-T
AD-630 257 FLD. 9/2

•NONR-1228(10)
NORTHWESTERN UNIV EVANSTON ILL TECHNOLOGICAL INST
AD-630 097 FLD. 5/1

•NONR-1509(03)
IOWA UNIV IOWA CITY INST OF HYDRAULIC RESEARCH
REPRINT-209
AD-630 018 FLD. 20/4

•NONR-1509(05)
IOWA UNIV IOWA CITY INST OF HYDRAULIC RESEARCH
F AD-630 203 FLD. 20/4

•NONR-1509(06)
IOWA UNIV IOWA CITY DEPT OF PHYSICS AND ASTRONOMY
AD-630 020 FLD. 4/1

•NONR-1575(03)
LOUISIANA STATE UNIV BATON ROUGE COASTAL STUDIES INST
TR-25
AD-630 023 FLD. 8/7
TR-26-PT-A
AD-630 027 FLD. 8/6
TR-15-PT-H
AD-630 028 FLD. 8/6
TR-16-PT-H
AD-630 031 FLD. 8/8

•NONR-1656(00)
EDSEL B FORD INST FOR MEDICAL RESEARCH DETROIT MICH
AD-630 145 FLD. 6/1

•NONR-1834(05)
ILLINOIS UNIV URBANA
AD-630 048 FLD. 20/8

•NONR-1834(13)
NOYES CHEMICAL LAB UNIV OF ILLINOIS URBANA
TR-88
AD-630 077 FLD. 7/4
TR-89
AD-630 078 FLD. 7/4

•NONR-1834(36)
ILLINOIS UNIV URBANA GROUP EFFECTIVENESS RESEARCH LAB
AD-630 021 FLD. 5/10

•NONR-1841(42)
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
AD-630 159 FLD. 20/1

•NONR-1841(73)
MASSACHUSETTS INST OF TECH CAMBRIDGE ENGINEERING PROJECTS LAB
DSR-8734-6
AD-630 295 FLD. 20/4

•NONR-1841(93)
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MECHANICAL ENGINEERING
AIAA PAPER-66-32
AD-629 957 FLD. 3/3
AD-630 217 FLD. 20/13
MASSACHUSETTS INST OF TECH CAMBRIDGE FLUID MECHANICS LAB
PUB-66-1
AD-629 937 FLD. 7/4

•NONR-1866(98)
HARVARD COLL OBSERVATORY CAMBRIDGE MASS
AD-629 958 FLD. 14/2

•NONR-1866(99)
HARVARD UNIV CAMBRIDGE MASS DIV OF ENGINEERING AND APPLIED PHYSICS
F AD-630 452 FLD. 20/12

•NONR-1883(00)
TEXACO EXPERIMENT INC RICHMOND VA
TP-241
AD-630 099 FLD. 7/4

•NONR-2121(29)

CHICAGO UNIV ILL
AD-630 173 FLD. 3/2
AD-630 174 FLD. 3/2

•NONR•2216(12)
SCRIPPS INSTITUTION OF OCEANOGRAPHY UNIV OF CALIFORNIA LA JOLLA
AD-629 997 FLD. 8/10

•NONR•2216(23)
SCRIPPS INSTITUTION OF OCEANOGRAPHY UNIV OF CALIFORNIA LA JOLLA
AD-630 194 FLD. 8/10
AD-630 195 FLD. 8/7

•NONR•2249(08)
CATHOLIC UNIV OF AMERICA WASHINGTON D C
2-65
AD-630 033 FLD. 20/1

•NONR•2279(00)
APPLIED PSYCHOLOGICAL SERVICES WAYNE PA
AD-630 170 FLD. 5/9

•NONR•2285(04)
DELAWARE UNIV NEWARK
(NAVMED-MF022.01.03-1002)
AD-630 493 FLD. 5/10

•NONR•2296(01)
MISSOURI UNIV COLUMBIA DEPT OF PHYSICS
TR-30
AD-630 163 FLD. 19/2
TR-31
AD-630 164 FLD. 7/4

•NONR•2332(00)
NAVAL WARFARE RESEARCH CENTER STANFORD RESEARCH INST MENLO PARK CALIF
F AD-630 122 FLD. 8/12

•NONR•2458(00)
HILLER AIRCRAFT CORP PALO ALTO CALIF
ARD-283
S AD-629 951 FLD. 21/5

•NONR•2595(05)
OKLAHOMA STATE UNIV STILLWATER SCHOOL OF CIVIL ENGINEERING
F AD-629 895 FLD. 20/4

•NONR•2960(01)
MONTANA STATE UNIV MISSOULA
AD-630 169 FLD. 5/10

•NONR•2964(01)
SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY RAPID CITY
TR-17
AD-630 161 FLD. 20/12
TR-18
AD-630 162 FLD. 19/2
SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY RAPID CITY DEPT OF PHYSICS
TR-16
AD-630 160 FLD. 11/2

•NONR•2993(00)
STANFORD RESEARCH INST MENLO PARK CALIF
AD-630 179 FLD. 6/16

•NONR•3656(12)
CALIFORNIA UNIV SAN FRANCISCO MEDICAL CENTER
AD-630 178 FLD. 6/5

•NONR•3659(00)
CORNELL AERONAUTICAL LAB INC BUFFALO N Y
CAL-AG-1634-V-9
F AD-630 005 FLD. 13/10

•NONR•3720(01)
MARYLAND UNIV COLLEGE PARK DEPT OF PSYCHOLOGY
AD-630 177 FLD. 5/10

•NONR•3734(00)
TEXAS UNIV AUSTIN
AD-630 181 FLD. 7/4

•NONR•3748(02)
HAWAII INST OF GEOPHYSICS HONOLULU
HIG-69-17
AD-629 887 FLD. 8/11

•NONR•3897(05)
DARTMOUTH COLL HANOVER N H
AD-630 176 FLD. 5/7

•NONR•3942(00)
GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND DEVELOPMENT CENTER
AD-630 438 FLD. 14/2

•NONR•3963
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF NAVAL ARCHITECTURE AND MARINE ENGINEERING
69-12
F AD-630 430 FLD. 13/10

•NONR•4006(00)
STATE UNIV OF NEW YORK STONY BROOK COLL OF ENGINEERING
(AFOSR-69-2153)
AD-629 848 FLD. 6/1

•NONR•4024(00)
GENERAL ATOMIC SAN DIEGO CALIF
AD-630 180 FLD. 20/8

•NONR•4071(00)
WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS
WHOI-REF-66-5
F AD-630 110 FLD. 4/2

•NONR•4095(00)
GEOSCIENCE LTD LA JOLLA CALIF
GLR-49
AD-630 303 FLD. 6/16

•NONR•4119(00)
LINDE DIV UNION CARBIDE CORP TONAWANDA N Y
AD-630 403 FLD. 6/13

•NONR•4259(16)
COLUMBIA UNIV NEW YORK DEPT OF ELECTRICAL ENGINEERING
CU-1-66-NONR4259(16)-EE
AD-630 184 FLD. 20/6

•NONR•4311(00)
CATHOLIC UNIV OF AMERICA WASHINGTON D C DEPT OF MATHEMATICS
TR-660131
AD-630 298 FLD. 12/1

•NONR•4427(00)
SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
TM-1908/200/00
AD-629 789 FLD. 5/7

•NONR•4511(00)
MONSANTO RESEARCH CORP EVERETT MASS BOSTON LAB
MRB-300907
AD-629 886 FLD. 7/5

•NONR•4616(00)
LITTON PRECISION PRODUCTS INC MORRIS PLAINS N J AIRTRON DIV
S AD-630 259 FLD. 20/2

•NONR•4768(00)
HYDRONAUTICS INC LAUREL MD
TR-511-3
AD-630 489 FLD. 13/10.1

•NONR•4811(00)
VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ECONOMICS
ONR-RM-4
AD-629 899 FLD. 12/2

•NONR•4920(00)
DUNLAP AND ASSOCIATES INC DARIEN CONN
SSD-66-296(571)
F AD-630 518 FLD. 5/9

•NORD•7386
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
CM-936
AD-630 029 FLD. 6/16

•NOW-62-06-09-C
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
TG-798
AD-630 036 FLD. 22/2

•NOW-62-0609-C
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB
TG-230-T491
(TT-66-60762)
AD-630 026 FLD. 19/1
TG-539
AD-630 034 FLD. 22/3
TG-743
AD-630 035 FLD. 20/10
TG-739
AD-630 037 FLD. 20/10
TG-741
AD-630 038 FLD. 9/5
TG-760
AD-630 039 FLD. 12/1
TG-746
AD-630 040 FLD. 20/9
TG-681
AD-630 049 FLD. 22/3
TG-794
AD-630 046 FLD. 12/1
TG-737
AD-630 070 FLD. 11/6
TG-610-7
AD-630 330 FLD. 21/5
TG-722
AD-630 335 FLD. 12/1
TG-792
AD-630 342 FLD. 20/4

•NOW-63-0123-D
PENNSYLVANIA STATE UNIV UNIVERSITY PARK ORDNANCE RESEARCH LAB
TM 633.2721-03
AD-629 897 FLD. 20/14
TM-619-3111-06
AD-629 898 FLD. 20/11
TM-630-3281-03
AD-630 408 FLD. 14/2

•NOW-63-0224-F
SOUTHWEST RESEARCH INST SAN ANTONIO TEX DEPT OF AEROSPACE PROPULSION RESEARCH
RS-485
AD-629 938 FLD. 11/8

•NOW-63-0259 C
BATTELLE MEMORIAL INST COLUMBUS OHIO
F AD-630 427 FLD. 11/6

•NOW-63-0319-F
ALPHA RESEARCH AND DEVELOPMENT INC BLUE ISLAND ILL
F AD-629 899 FLD. 11/4

•NOW-63-0363-C
MECHANICAL TECHNOLOGY INC LATHAM N Y
MTI-66TR18
AD-630 209 FLD. 13/8

•NOW-63-0470-D
SPACE-GENERAL CORP EL MONTE CALIF ARTIFICIAL BIOSYSTEMS LAB
AD-629 896 FLD. 7/4

•NSF•13979
CALIFORNIA UNIV SAN DIEGO LA JOLLA
INST OF GEOPHYSICS AND PLANETARY PHYSICS
AD-629 877 FLD. 9/2

•NSF•G-11309
PITTSBURGH UNIV PA DEPT OF PHYSICS
(AFOSR-66-0986)
AD-630 241 FLD. 20/8

•NSF•G19627
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
AD-630 499 FLD. 7/4

•NSF•G20957
EDSEL B FORD INST FOR MEDICAL RESEARCH DETROIT MICH
AD-630 148 FLD. 6/1

•NSF•GB-4
ILLINOIS UNIV URBANA DEPT OF MICROBIOLOGY
AD-629 968 FLD. 6/13
AD-629 966 FLD. 6/13

•NSF•GF-153
HAWAII INST OF GEOPHYSICS HONOLULU
HIG-65-17
AD-629 857 FLD. 8/11

•NSF•GK-690
ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB
R-281
AD-630 029 FLD. 9/4

•NSF•GP-3
MARYLAND UNIV COLLEGE PARK INST FOR FLUID DYNAMICS AND APPLIED MATHEMATICS
(AFOSR-65-2329)
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AD-629 939 FLD. 5/1

AIR-D938-6/65-RP(C)
AD-629 941 FLD. 5/1

AIR-D93B=6/69=TR(A=1)
AD=629 914 FLD. 5/1
AD=629 915 FLD. 5/1

AIR-D93B=6/69=TR(B=1)
AD=630 015 FLD. 5/1
AD=630 016 FLD. 5/1

AIR-D93B=6/69=TR(C=1)
AD=629 935 FLD. 5/1
AD=630 052 FLD. 5/1

AIR-D93C 6/69=RP
AD=629 940 FLD. 5/1

AIR-D93C=6/69=TR(I)
AD=629 926 FLD. 5/1

AIR-D93C=6/69=TR(II)
AD=629 927 FLD. 5/1

AMBRL=TR=6516
AD=629 969 FLD. 6/12

AMBRL=TR=6601
AD=629 970 FLD. 6/5

AMP=184
AD=630 900 FLD. 7/4

AMRA=CR=69=01/4
AD=630 359 FLD. 11/4

AMRA=TR=69=31
AD=629 908 FLD. 13/8

AMRA=TR=69=33
AD=630 967 FLD. 7/4

AMRL=TR=69=191
AD=630 119 FLD. 6/19

AMRL=TR=69=194
AD=629 992 FLD. 5/9

AMRL=TR=69=169
AD=629 902 FLD. 5/10

AMRL=TR=69=208
AD=629 769 FLD. 6/20

AMRL=TR=69=211
AD=629 870 FLD. 6/5

AMRL=TR=69=232
AD=630 962 FLD. 6/16

ARD=293
AD=629 981 FLD. 21/5

ARL=69=193
AD=630 348 FLD. 7/4

ARL=69=195
AD=630 346 FLD. 12/1

ARL=69=229
AD=630 380 FLD. 21/2

ARL=69=239
AD=630 347 FLD. 20/13

ARL=69=254
AD=629 763 FLD. 20/10

ARL=69=255
AD=629 787 FLD. 11/6

ARL=69=259
AD=629 776 FLD. 11/2

ARL=69=261
AD=630 349 FLD. 20/8

ARL=69=262
AD=630 345 FLD. 20/3

ARL=66=0090
AD=630 991 FLD. 20/12

AROD=1817:68
AD=630 100 FLD. 12/1

AROD=2991:14
AD=630 158 FLD. 7/4

AROD=2832:26
AD=630 004 FLD. 7/3

AROD=2841:6
AD=630 071 FLD. 11/6

AROD=3269:20
AD=630 084 FLD. 20/8

AROD=3269:27
AD=630 042 FLD. 20/8

AROD=3299:5
AD=630 007 FLD. 7/3

AROD=3299:6
AD=630 008 FLD. 7/3

AROD=3299:7
AD=630 009 FLD. 7/3

AROD=3829:1
AD=629 949 FLD. 20/12

AROD=3829:3
AD=629 975 FLD. 20/8

AROD=3829:4
AD=629 943 FLD. 20/12

AROD=3953:2
AD=630 006 FLD. 7/2

AROD=4313:9
AD=630 067 FLD. 14/2

AROD=4375:8
AD=630 072 FLD. 7/5

AROD=4617:3
AD=630 000 FLD. 7/4

AROD=4832:7
AD=630 074 FLD. 20/9

AROD=4890:3
AD=630 075 FLD. 7/2

AROD=5023:3
AD=630 060 FLD. 11/6

AROD=5092:1
AD=630 054 FLD. 7/3

AROD=5092:5
AD=630 055 FLD. 7/4

AROD=5092:7
AD=630 058 FLD. 14/2

AROD=5092:8
AD=630 059 FLD. 7/4

AROD=5092:9
AD=630 057 FLD. 7/3

AROD=5107:4
AD=630 002 FLD. 7/4

AROD=5117:1
AD=630 188 FLD. 9/1

AROD=5838:1
AD=630 102 FLD. 7/3

ARPA=20
AD=630 959 FLD. 7/4

ARPA=21
AD=630 957 FLD. 7/4

ARPA=22
AD=630 958 FLD. 7/4

ATD=69=119
AD=630 950 FLD. 20/4

ATD=69=115
AD=630 360 FLD. 18/4

ATD=69=116
AD=629 780 FLD. 19/1

ATD=66=3
AD=630 328 FLD. 9/1

ATD=66=9
AD=629 768 FLD. 7/4

ATD=66=27
AD=630 168 FLD. 20/4

AWS=TR=186
AD=630 289 FLD. 4/2

BERKELEY REPRINT=228
AD=630 238 FLD. 3/2

BERKELEY REPRINT=239
AD=630 234 FLD. 3/2

BN=437
AD=629 888 FLD. 20/13

BRL=1301
AD=630 064 FLD. 9/1

BRL=1304
AD=630 068 FLD. 14/2

BRL=MR=1700
AD=629 922 FLD. 4/1

BRL=MR=1701
AD=630 063 FLD. 9/1

BRL=MR=1709
AD=630 329 FLD. 20/4

CAL=AG=1634-V=9
AD=630 008 FLD. 13/10

CAL=BB=1994=5=1
AD=629 782 FLD. 20/4

CAL=BB=1994=5=2
AD=629 783 FLD. 20/4

CCL=194
AD=630 916 FLD. 21/4

CDS=1=66
AD=630 296 FLD. 4/2

CM=936
AD=630 025 FLD. 6/16

CONTRIB=69=4
AD=630 023 FLD. 8/7

CONTRIB=69=5
AD=630 027 FLD. 8/6

CONTRIB=69=7
AD=630 028 FLD. 8/6

CONTRIB=69=8
AD=630 031 FLD. 8/8

CR=69=419-21-VOL=1
AD=630 254 FLD. 15/3

CRDLR=3324
AD=630 117 FLD. 9/1

CU=1=66=NONR4259(16)-EE
AD=630 184 FLD. 20/6

D1=82=0470
AD=629 882 FLD. 3/1

D1=82=0480
AD=630 017 FLD. 7/4

D1=82=0497
AD=629 873 FLD. 12/1

DASA=1721

AD-630 292 FLD. 19/6

DCBRL-463
AD-629 760 FLD. 7/3

DRML-RP-542
AD-630 492 FLD. 14/2

DSR-4632
AD-630 430 FLD. 13/10

DSR-8734-6
AD-630 295 FLD. 20/4

DTMB-1823
AD-630 318 FLD. 11/4

DTMB-1944-SUPPL
AD-630 319 FLD. 13/10

DTMB-1984
AD-630 115 FLD. 14/2

DTMB-2116
AD-629 917 FLD. 14/2

DTMB-2129
AD-630 245 FLD. 9/2

DTMB-2149
AD-629 872 FLD. 13/10

DTMB-2159
AD-630 305 FLD. 20/4

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AD-630 460 FLD. 4/2

EBR-183
AD-630 001 FLD. 13/8

ECOM-01313-2
AD-629 948 FLD. 9/1

ECOM-01420-1
AD-630 344 FLD. 9/1

ECOM-01420-2
AD-630 394 FLD. 9/1

ECOM-2656
AD-630 250 FLD. 9/1

ECOM-2667
AD-630 341 FLD. 20/3

ECOM-2671
AD-630 192 FLD. 20/14

ECOM-TR-01279-1
AD-629 904 FLD. 20/14

EDL-M859
AD-629 889 FLD. 9/6

EDL-M888
AD-629 930 FLD. 9/1

EDL-M889
AD-629 890 FLD. 9/1

ERDL-998T-1
AD-629 762 FLD. 10/2

ERL-65-29
AD-630 128 FLD. 20/14

ESD-TDR-63-176
AD-630 096 FLD. 12/1

ESD-TDR-63-396
AD-630 333 FLD. 5/10

ESD-TDR-65-232
AD-630 243 FLD. 17/2

ESD-TDR-65-306
AD-630 194 FLD. 20/12

ESD-TDR-65-492
AD-629 923 FLD. 17/9

ESD-TDR-66-21
AD-629 936 FLD. 17/9

ESD-TDR-66-22
AD-629 968 FLD. 12/1

ESD-TDR-66-26
AD-630 364 FLD. 20/12

ESD-TDR-66-27
AD-630 366 FLD. 14/2

ESD-TDR-66-39
AD-630 368 FLD. 3/2

ESD-TDR-66-37
AD-630 370 FLD. 7/4

ESD-TDR-66-38
AD-630 372 FLD. 20/12

ESD-TDR-66-39
AD-630 373 FLD. 20/5

ESD-TDR-66-40
AD-630 374 FLD. 9/4

ESD-TDR-66-41
AD-629 934 FLD. 9/4

ESD-TDR-66-43
AD-630 193 FLD. 17/9

ESD-TE-66-137
AD-629 867 FLD. 9/2

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AD-630 099 FLD. 7/4

FA-R-1791
AD-630 242 FLD. 19/2

FA-R-1800
AD-630 420 FLD. 11/6

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AD-630 069 FLD. 12/1

FMU-5198
AD-629 992 FLD. 11/2

FR-65-10-252
AD-629 948 FLD. 9/1

FSTC-381-T65-483-A
AD-629 876 FLD. 13/10

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AD-630 414 FLD. 20/11

FTD-TT-65-590
AD-630 415 FLD. 6/5

FTD-TT-65-1305
AD-630 280 FLD. 9/5

FTD-TT-65-1379
AD-630 413 FLD. 20/11

FTD-TT-65-1606
AD-630 286 FLD. 20/4

FTD-TT-65-1639
AD-630 412 FLD. 11/6

FTD-TT-65-1680
AD-630 263 FLD. 20/6

FTD-TT-65-1774
AD-630 288 FLD. 21/2

FTD-TT-65-1783
AD-630 273 FLD. 13/11

FTD-TT-65-1846
AD-630 284 FLD. 21/5

FTD-TT-65-1928
AD-630 411 FLD. 20/4

FTD-TT-65-1934
AD-630 265 FLD. 14/2

FTD-TT-65-1944
AD-630 272 FLD. 21/5

FTD-TT-65-1949
AD-630 287 FLD. 20/4

FTD-TT-66-23
AD-630 282 FLD. 9/2

FTD-TT-66-26
AD-630 274 FLD. 22/1

FTD-TT-66-46
AD-630 264 FLD. 9/3

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AD-629 893 FLD. 9/1

GA-6738
AD-630 137 FLD. 7/4

GARD-1268-40
AD-630 423 FLD. 18/6

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AD-630 303 FLD. 6/16

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AD-629 887 FLD. 6/6

HIG-65-17
AD-629 857 FLD. 8/11

I-8711
AD-629 911 FLD. 6/5

IMM-NYU-396
AD-630 506 FLD. 20/6

JA-2451A
AD-630 368 FLD. 3/2

JA-2520
AD-630 369 FLD. 20/12

JA-2565
AD-630 366 FLD. 14/2

JA-2580
AD-630 370 FLD. 7/4

JA-2599
AD-630 372 FLD. 20/12

JA-2642
AD-630 373 FLD. 20/5

JA-2650
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AD-630 425 FLD. 20/4

LGO-858
AD-630 101 FLD. 8/11

LN-285-65
AD-629 909 FLD. 13/10

LT-65-102
AD-629 910 FLD. 5/2

M-62
AD-630 244 FLD. 20/4

MAB-214-M
AD-630 296 FLD. 11/4

MAB-217-M
AD-630 276 FLD. 11/6

MATHEMATICAL NOTE-428
AD-629 882 FLD. 3/1

MATHEMATICAL NOTE-442
AD-629 873 FLD. 12/1

MEL-10/66
AD-630 421 FLD. 13/11

MEL-37/66
AD-629 789 FLD. 20/11

MEL-72/66
AD-630 969 FLD. 13/8

MEL-98/66
AD-630 933 FLD. 13/10

MEL-131-66
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MISCELLANEOUS PAPER-1-66
AD-629 978 FLD. 8/10

MISCELLANEOUS PAPER-6-716
AD-630 066 FLD. 13/3

MISCELLANEOUS PUB-3
AD-630 175 FLD. 6/13

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AD-629 980 FLD. 20/13

MR8-300987
AD-629 886 FLD. 7/5

MS-3831-102-66U
AD-629 903 FLD. 11/6

MTI-66TR18
AD-630 209 FLD. 13/8

N62-22926
AD-630 333 FLD. 5/10

N65-26855
AD-629 980 FLD. 20/13

NADC-AE-6608
AD-630 990 FLD. 13/8

NADC-MR-6515
AD-630 391 FLD. 5/10

NAEC-ASL-1093
AD-629 931 FLD. 1/2

NAFI-TR-764
AD-629 946 FLD. 13/8

NASA-SP-98
AD-629 980 FLD. 20/13

NAVMED-MF022.01.03-1002
AD-630 953 FLD. 5/10

NAVMED-MR005.08-1
AD-630 329 FLD. 6/18

NAVMED-MR005.08-1200-1
AD-630 390 FLD. 6/18

NAVMED-MR005.08-1200-2
AD-630 331 FLD. 6/1

NAVMED-MR005.08-1200-4
AD-630 103 FLD. 6/18

NAVMED-MR005.08-5201-1
AD-630 332 FLD. 6/18
AD-630 338 FLD. 6/18

NAVTRADEVCEN-1341-1
AD-630 312 FLD. 5/9

NAVTRADEVCEN-1491-2
AD-630 278 FLD. 21/4

NAVTRADEVCEN-1995-1
AD-630 268 FLD. 20/4

NAVTRADEVCEN-4119-1
AD-630 260 FLD. 5/9

NAVTRADEVCEN-IH-98
AD-630 275 FLD. 5/9

NAVWEPS-8986
AD-630 986 FLD. 20/10

NAVWEPS-9847
AD-630 014 FLD. 9/2

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AD-630 118 FLD. 19/5

NL-2
AD-630 132 FLD. 19/5

NOL-TR-65-191
AD-630 934 FLD. 11/4

NOLTR-64-158
AD-629 788 FLD. 9/2

NOLTR-65-179
AD-630 951 FLD. 20/12

NOLTR-66-14
AD-630 244 FLD. 20/4

NOTS-TP-3953
AD-630 956 FLD. 20/10

NOTS-TP-3976
AD-630 248 FLD. 13/8

NOTS-TP-4052
AD-630 014 FLD. 9/2

NRC-8744
AD-629 771 FLD. 6/13

NRC-8715
AD-629 755 FLD. 6/1

NRC-8719
AD-629 758 FLD. 6/3

NRC-8726
AD-629 756 FLD. 22/2

NRC-8737
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AD-629 757 FLD. 4/1

NRC-8758
AD-629 901 FLD. 7/3

NRC-8762
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NRC-8799
AD-629 753 FLD. 11/6

NRC-8800
AD-629 772 FLD. 7/1

NRC-8807
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NRL-6349
AD-629 881 FLD. 18/10

NRL-6372
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NTDC-IH-17
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AD-629 799 FLD. 5/10

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AD-630 119 FLD. 12/2

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AD-630 357 FLD. 19/1

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AD-629 769 FLD. 1/2

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AD-629 907 FLD. 12/2

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AD-629 906 FLD. 19/5

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AD-630 298 FLD. 5/3

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AD-629 767 FLD. 19/1

PA-TM-197-62
AD-630 410 FLD. 14/2

PA-TN-1302
AD-629 884 FLD. 19/1

PIBAL-911
AD-630 019 FLD. 11/9

PIBAL-963
AD-629 778 FLD. 20/4

PIBMRI-1303-65
AD-630 144 FLD. 20/14

PMR-TM-66-2
AD-629 976 FLD. 12/1

PR-7500-145
AD-630 089 FLD. 5/2

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AD-629 937 FLD. 7/4

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AD-630 337 FLD. 20/4

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AD-630 029 FLD. 9/4

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AD-630 030 FLD. 9/2

RADC-65-232-VOL-1
AD-630 472 FLD. 9/5

RADC-65-232-VOL-2
AD-630 473 FLD. 17/2.1

RADC-TR-65-232-VOL-3
AD-630 965 FLD. 9/4

RADC-TR-65-399
AD-629 766 FLD. 9/2

RADC-TR-65-479
AD-630 207 FLD. 14/1

RADC-TR-65-529
AD-630 471 FLD. 6/4

RADC-TR-65-529-VOL-1
AD-630 124 FLD. 20/14

RADC-TR-66-6
AD-630 127 FLD. 5/2

RADC-TR-66-12
AD-629 849 FLD. 20/3

RADC-TR-66-20
AD-630 474 FLD. 9/1

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AD-630 049 FLD. 9/5

RDM-5069-84
AD-629 891 FLD. 11/10

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AD-630 018 FLD. 20/4

RIA-66-382
AD-629 972 FLD. 11/10

RIA-66-826
AD-629 973 FLD. 13/8

RIA-66-734
AD-629 918 FLD. 11/8

RM-8
AD-630 091 FLD. 9/5

RM-9
AD-630 092 FLD. 9/1

RM-10
AD-630 093 FLD. 9/5

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AD-630 094 FLD. 9/1

RM-18
AD-630 047 FLD. 12/2

RM-4196-ARPA
AD-630 316 FLD. 6/16

RM-4752-PR
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RM-4758-PR
AD-629 920 FLD. 12/2

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AD-629 953 FLD. 12/1

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AD-630 271 FLD. 17/2

RM-4782-PR
AD-630 301 FLD. 17/2

RM-4892-PR
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RM-4896-PR
AD-630 343 FLD. 12/1

RM-4898-ARPA
AD-630 422 FLD. 17/1

RM-4906-PR
AD-630 121 FLD. 12/1

RM-4915-PR
AD-630 247 FLD. 12/1

RM-4919-PR
AD-630 300 FLD. 12/2

RM-4944-PR
AD-630 266 FLD. 12/1

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AD-630 270 FLD. 20/4

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AD-630 143 FLD. 20/9

RR-170
AD-629 977 FLD. 8/12

RR-174
AD-630 116 FLD. 8/12

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AD-629 875 FLD. 8/13

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AD-629 932 FLD. 20/1

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AD-629 938 FLD. 11/8

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AD-629 770 FLD. 20/2

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AD-629 928 FLD. 13/13

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AD-630 478 FLD. 17/2

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AD-630 480 FLD. 6/5

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AD-629 994 FLD. 20/14
AD-630 112 FLD. 3/2

SCIENTIFIC-2
AD-629 773 FLD. 1/3
AD-630 074 FLD. 20/9
AD-630 143 FLD. 20/9

SCIENTIFIC-3
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AD-629 925 FLD. 20/5
AD-630 392 FLD. 20/11

SCIENTIFIC-5
AD-630 111 FLD. 8/7
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SCIENTIFIC-6
AD-629 996 FLD. 3/2
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AD-629 993 FLD. 20/14

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SM-51974
AD-630 182 FLD. 9/1

SM-51997
AD-630 183 FLD. 9/1

SP-862
AD-630 146 FLD. 13/2

SP-1132
AD-630 148 FLD. 12/2

SP-1137
AD-630 149 FLD. 12/2

SP-1432
AD-630 150 FLD. 5/2

SRRC-RR-65-115
AD-630 428 FLD. 9/4

SSD-66-296(5571)
AD-630 518 FLD. 5/9

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AD-630 483 FLD. 6/12

TAE-99
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AD-630 354 FLD. 13/10

TG-230-T491
AD-630 026 FLD. 19/1

TG-339
AD-630 034 FLD. 22/3

TG-610-7
AD-630 330 FLD. 21/5

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TG-722
AD-630 335 FLD. 12/1

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AD-630 070 FLD. 11/6

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AD-630 037 FLD. 20/10

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AD-630 038 FLD. 9/5

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AD-630 035 FLD. 20/10

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AD-630 342 FLD. 20/4

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AD-630 046 FLD. 12/1

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AD-630 039 FLD. 12/1

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TM-65-52
AD-630 166 FLD. 6/12

TM-619-3111-06
AD-629 898 FLD. 20/11

TM-630-3281-03
AD-630 408 FLD. 14/2

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AD-629 897 FLD. 20/14

TM-738/024/00
AD-630 424 FLD. 9/2

TM-1908/200/00
AD-629 789 FLD. 5/7

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AD-630 096 FLD. 12/1

TM-(L)-763/000/01
AD-630 151 FLD. 9/2

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AD-629 936 FLD. 17/9

TN-1966-7
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TN-1966-9
AD-629 934 FLD. 9/4

TN-1966-13
AD-630 193 FLD. 17/9

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AD-630 294 FLD. 20/4

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AD-630 099 FLD. 7/4

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AD-630 248 FLD. 13/8

TR-1
AD-630 013 FLD. 20/12

AD=630 986 FLD. 20/11

TR=9
AD=630 082 FLD. 8/10
AD=630 290 FLD. 20/11

TR=5
AD=630 197 FLD. 13/8
AD=630 291 FLD. 20/11

TR=6
AD=630 269 FLD. 20/11

TR=8
AD=630 011 FLD. 20/3

TR=11
AD=630 319 FLD. 5/10
AD=630 959 FLD. 20/12

TR=19=PT=H
AD=630 028 FLD. 8/6

TR=16
AD=630 160 FLD. 11/2

TR=16=PT=H
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630 460	9/2
630 461	7/9
630 462	6/16
630 463	22/2
630 464	13/8
630 465	9/9
630 466	6/7
630 467	7/9
630 468	14/2
630 469	22/2
630 470	20/6
630 471	6/9
630 472	9/5
630 473	17/2.1
630 474	9/1
630 475	9/10
630 476	6/19
630 477	5/9
630 478	17/2
630 479	6/13
630 480	6/5

630 481	3/2	630 490	13/8	630 500	9/5	630 510	20/10
630 482	3/2	630 491	20/12	630 501	7/9	630 511	20/10
630 483	6/12	630 492	19/2	630 502	6/3	630 512	20/8
630 484	5/9	630 493	5/7	630 503	20/5	630 513	9/2
		630 494	9/9	630 504	20/9	630 514	6/13
630 485	13/10.1	630 495	7/9	630 505	7/9		
630 486	20/11	630 496	17/2	630 506	20/6	630 515	8/11
630 487	5/3	630 497	20/5	630 507	20/10	630 516	12/1
630 488	6/3	630 498	7/9	630 508	20/10	630 517	20/10
630 489	9/2	630 499	7/9	630 509	20/10	630 518	9/9

OTHER RESEARCH REPORTS AND RELATED MATERIAL

1. AERONAUTICS

AD-402 924 **Field 1E, 13M**
CFSTI Price: HC$14.60
National Aviation Facilities Experimental Center, Atlantic City, N. J. Research Div.
INVESTIGATION OF CHARACTERISTICS OF THE PENTAGONAL TOWER CAB,
Final rept.,
by T. H. Green. Feb 63, 149p
Proj. 101-910R
N63 15395

Descriptors: (*Airport control towers, Design), (*Air traffic control terminal areas, Airport control towers), Terminal flight facilities, Structures, Geometric forms, Performance (Engineering).

A proposed pentagonal tower cab is investigated with particular attention being given to relations between several design features and visibility. While shape itself was not studied as a design alternative, certain findings on the effects of shape of the cab, as well as on slope of glass windows, height of ceiling, interior equipment, and other dimensions, are presented. Concurrent analytic, physical, and operational approaches were utilized. Based on progress to date, conclusions and suggestions for future investigation are stated. An automated window washing system is proposed, and results of preliminary tests of the system are reported. (Author)

AD-465 895 **Field 1C**
CFSTI Prices: HC$1.00 MF$0.50
David Taylor Model Basin, Washington, D. C.
SHROUDED PROPELLER TESTS OF THE EFFECT OF SHROUD CAMBER ON THE THRUST COEFFICIENT FOR MINIMUM SHROUD DRAG,
by Arthur E. Johnson. Apr 65, 25p Rept. no. 2005, Aero-1090

Descriptors: (*Shrouded propellers, Thrust), Drag, Optimization, Camber, Design, Wind tunnels, Tests.

A wind-tunnel investigation of a powered, shrouded propeller with a related series of positively cambered shrouds was made in order to determine the effect of shroud camber on the thrust coefficient that yields minimum shroud drag coefficient. Experimental measurements agree reasonably well with theoretical predictions, but are generally somewhat higher than the predicted results. (Author)

AD-466 621 **Field 1C, 13J**
CFSTI Prices: HC$2.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Aerodynamics Lab.
FEASIBILITY OF SIX-DEGREE-OF-FREEDOM GEM MODEL TESTING IN THE DAVID TAYLOR MODEL BASIN MANEUVERING AND SEAKEEPING FACILITY,
by Martin D. Fink. May 65, 32p Aero-1084
DTMB 2004,
N65 30829

Descriptors: (*Ground effect machines, Model tests), (*Amphibious vehicles, Model tests), Feasibility studies, Dynamics, Test facilities, Performance (Engineering), Kinetic energy, Acceleration.

Results of investigation of six-degree-of-freedom dynamic GEM model, tested in DTMB Maneuvering and Seakeeping (MASK) Facility over random seas of various states, are presented Primary purpose of investigation was to study feasibility of six-degree-of-freedom GEM model testing in this facility. Data were obtained using a plenum-type submerged sidewall model employing flexible cloth 'skirts' for bow and compartmentation seats, and propelled by air escaping under aft flaps. Performance characteristics are evaluated in terms of kinetic energy of escaping air and model speed Seakeeping characteristics are evaluated in terms of root-mean-square accelerations. With some qualifications, it is concluded that tests of this type are feasible and useful. (Author)

AD-467 022 **Field 1A, 14B**
CFSTI Prices: HC$2.00 MF$0.50
General Applied Science Labs., Inc., Westbury, N. Y.
CALIBRATION OF A MACH 12 SQUARE NOZZLE.
Technical rept.,
by J. Ranlet. Jul 65, 33p GASL-TR-531
Contract AF40 (600)-1120,
Proj. AF-8950,
Task 895001
AEDC TR-65-167;
N65 33337

Descriptors: (*Hypersonic nozzles, Calibration), (*Hypersonic wind tunnels, Nozzles), Pressure, Temperature, Tests.

An experimental investigation was made of the flow field in the test section of a Mach 12 nozzle having all square cross sections. Pressure as well as temperature measurements were made in the test section of the nozzle. The results show that the Mach number within the test rhombus of the nozzle was 12.10 plus or minus 0.20. Furthermore, the problem of focusing, which is usually encountered in axially symmetric nozzles, is eliminated. (Author)

AD-467 593 **Field 1A, 20D**
CFSTI Prices: HC$3.00 MF$0.75
Michigan Univ., Ann Arbor. Aircraft Propulsion Lab.
THE EFFECT OF LONGITUDINAL VISCOSITY ON THE FLOW AT A NOZZLE THROAT,
by Martin Sichel. Jun 65, 64p 05800-1-F
Grant DA-ARO (D)-31-124-G385,
Projs. ORA-05143, ORA-05800
AROD 3537:1

Descriptors: (*Nozzle gas flow, Viscosity), (*Nozzle throats, Nozzle gas flow), (*Transonic flow, Equations), Viscosity, Shock waves, Heat transfer.

An inviscid transonic theory appears to be inadequate to describe the flow near the throat of a convergingdiverging nozzle during the transition from the symmetrical Taylor (1930) type of flow to the subsonic-supersonic Meyer (1908) flow. An exact nozzle type of similarity solution of the viscous-transonic equation, similar to the inviscid solution of Tomotika and Tamada (1950), was found. This solution does provide a description of the gradual transition from the Taylor to the Meyer flow and shows the initial stages in the development of a shock wave downstream of the nozzle throat. The solution provides a viscous shock like transition from an inviscid supersonic accelerating flow to an inviscid subsonic decelerating flow. (Author)

AD-468 284 **Field 1A**
CFSTI Prices: HC$5.60 MF$0.75
Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
SUPERSONIC FLOW ABOUT RIGHT CIRCULAR CONES AT ZERO YAW IN AIR AT CHEMICAL EQUILIBRIUM. PART I. CORRELATION OF FLOW PROPERTIES.
Technical memo.,
by Henry E. Hudgins, Jr. Aug 65, 60p TM-1493

Descriptors: (*Conical bodies, Supersonic flow), Chemical equilibrium, Yaw, Shock waves, Fluid flow, Velocity, Enthalpy, Programming (Computers), Angle of attack, Mathematical analysis, Taylor's series, Boundary layer, Tables, Experimental data, Hypersonic flow, Pressure, Entropy, Surface properties.

This report (Part I) presents, in the form of correlation plots and formulas, the data tabulated in Parts II and III. This data is for the inviscid flow properties of right circular cones at zero yaw in air at chemical equilibrium. The flow properties at the cone surface or just behind the shock may be obtained directly from the correlations of this report. Methods for calculating the properties within the shock layer based on these correlations are indicated. The range for which accurate correlations of all parameters have been found is from the region of ideal gas behavio to free stream Mach numbers approaching infinity and semicone angles up to 40 degrees. Some correlations are valid at least as far as cone angles of 50 degrees, the limit of the data. These results apply only to attached shocks. (Author)

N66-12160 **Field 1D, 17G**
CFSTI Prices: HC$3.00 MF$0.75
Kaman Aircraft Corp., Bloomfield, Conn.
ANALYTICAL RESEARCH ON A SYNCHRONOUS GYROSCOPIC VIBRATION ABSORBER.
Contractor rept.,
by William G. Flannelly and John C. Wilson. Dec 65, 75p
Contract NASw-855
NASA CR-338

Descriptors: (*Gyroscopes, Vibration isolators), (*Vibration isolators, Synchronization (Electronics)).

N66-13555 **Field 1A, 3B, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE USE OF CONVENTIONAL WIND TUNNELS TO SIMULATE PLANETARY ATMOSPHERIC AERODYNAMICS,
by N. Fox and H. Koester. 15 Nov 65, 14p JPL-TR-32-762
Contract NAS7-100
NASA CR-68792

Descriptors: (*Planetary atmospheres, Simulation), (*Aerodynamics, Planetary atmospheres), Super sonic wind tunnels, Carbon dioxide.

N66-14755 **Field 1A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
AERODYNAMIC DAMPING AND OSCILLATORY STABILITY IN PITCH FOR A MODEL OF A TYPICAL SUBSONIC JET-TRANSPORT AIRPLANE,
by M. L. Brower and B. R. Wright. Jan 66, 16p
NASA-TN-D-3159

Descriptors: (*Swept wings, Pitch), (*Jet transport planes, Stability).

N66-14756 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
EXPERIMENTAL STABILITY AND DRAG OF A POINTED AND A BLUNTED 30 DEG HALF-ANGLE CONE AT MACH NUMBERS FROM 11.5 TO 34 IN AIR,
by P. F. Intrieri. Jan 66, 32p NASA-TN-D-3193

Descriptors: (*Conical bodies, Stability).

N66-14762 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
A THEORETICAL AND EXPERIMENTAL STUDY OF HYPERSONIC FLOW OVER FLARED BODIES AT INCIDENCE,
by G. P. Menees and J. V. Rakich. Jan 66, 50p
NASA-TN-D-3218

214-537 O - 66 - 16

Descriptors: (*Flared afterbodies, Hypersonic flow), (*Hypersonic flow, Flared afterbodies).

N66-15200 **Field 1C**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
ESTIMATION OF FLIGHT PERFORMANCE WITH CLOSED-FORM APPROXIMATIONS TO THE EQUATIONS OF MOTION,
by C. M. Jackson, Jr. Jan 66, 36p NASA-TR-R-228

Descriptors: (*Equations of motion, Flight).

PB-169 220 **Field 1C, 1B**
CFSTI Prices: HC$1.00 MF$0.50
Naval Air Material Center, Philadelphia, Pa. Air Crew Equipment Lab.
DETERMINATION OF LOCATION FOR HIGH VISIBILITY AREAS ON EJECTION SEATS,
by Rosalie Noble and L. W. Hansen. 6 Feb 58, 12p NAMC-ACEL-364
Proj. TED-NAM-AE-52124
AD 156 469

Descriptors: (*Ejection seats, Colors), (*Aviation accidents, Ejection seats).

The results of a series of flight observations of variously colored ejection seats against several types of terrain indicate the advisability of a split color scheme for these seats. The use of the combination of white and a flourescent color has the advantage of providing the best reflecting and noticeability scheme to aid in the recovery of the ejected seat.

PB-169 221 **Field 1C, 5H**
CFSTI Prices: HC$1.00 MF$0.50
Naval Air Material Center, Philadelphia, Pa. Air Crew Equipment Lab.
COCKPIT DESIGN STUDIES; STANDARD COCKPIT MOCKUP: COMPONENTS OF VARIANCE IN ANTHROPOMETRY,
by J. Gaito and E. C. Gifford. 14 Jan 57, 18p NAMC-ACEL-320
Proj. TED-NAM-AE-7052-Pt-2
AD 123 425

Descriptors: (*Cockpits, Design), (*Aviation personnel, Anthropometry), Human engineering.

The data of an anthropometric study of eleven morphological features on forty-two subjects was analyzed by the analysis of variance so as to obtain estimates of inter-subject, intra-subject, inter-anthropometrist, and intra-anthropometrist sources of variation and to determine the proportion of total variance contributed by each of these. The results indicate that unreliable variance (which consists of the last three sources mentioned above) contributes as much as one-fifth of the total variance in morphological features which involve movement of the shoulder joint (anterior and maximum arm reach) and in buttock-leg length and is negligible in features such as height and weight. (Author)

PB-169 428 **Field 1A**
CFSTI Prices: HC$3.60 MF$0.50
Naval Ordnance Test Station, China Lake, Calif.
TRANSIENT LOADING OF WIDE DELTA AIRFOILS AT SUPERSONIC SPEEDS,
by John W. Miles. 13 Jun 50, 40p NOTS-295
NAVORD 1235,
ATI 89 721

Descriptors: (*Delta wings, Supersonic characteristics), (*Airfoils, Downwash), (*Gusts, Mathematical analysis), Angle of attack.

PB-169 450 **Field 1A, 1C**
CFSTI Prices: HC$5.60 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
MEASUREMENTS OF SKIN FRICTION ON A CAMBERED DELTA WING AT SUPERSONIC SPEEDS,
by K. G. Winter and K. G. Smith. Aug 65, 52p
Technical rept. no. TR-65181

Descriptors: (*Delta wings, Supersonic characteristics), (*Friction, Delta wings), Measurement, Boundary layer.

The measurements, using razor blade surface pitot tubes, show that the relatively mild pressure gradients and streamline convergence on the wing have a large effect on local skin friction. Application of the boundary layer momentum equation suggests that the change in skin friction arises directly from changes in the boundary layer profile. Despite large variations the total skin friction drag of the wing is within 10% of that of a flat plate. (Author)

3. ASTRONOMY AND ASTROPHYSICS

N65-33848 **Field 3A, 22B**
CFSTI Prices: HC$6.50 MF$1.25
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RANGER VII PHOTOGRAPHS OF THE MOON. PART III. CAMERA 'P' SERIES,
by Gerard P. Kuiper. Aug 65, 235p
NASA SP-63
Hard copy also available from Superintendent of Documents, GPO, Washington, D. C., 20402, $6.50.

Descriptors: (*Moon, Photographs), (*Lunar prober, Photographic techniques), (*Photographic techniques, Lunar probes), Astronomy.

Identifiers: Ranger spacecraft.

N66-12865 **Field 3B**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, New York. Goddard Inst. for Space Studies.
EVOLUTION OF O STARS. III - HELIUM BURNING,
by R. Stothers. 1965, 64p NASA-TM-X-56928

Descriptors: (*Stars, Theory), Astrophysics, Helium.

N66-12974 **Field 3B**
CFSTI Prices: HC$3.00 MF$0.75
California Univ., Berkeley. Space Sciences Lab.
THE ATMOSPHERE AND SURFACE OF MARS. A SELECTIVE REVIEW,
by D. G. Rea. 1965, 67p
Contract NASR-220, Grant NsG-101
NASA CR-68136
Prepared for presentation at Lunar and Planetary Seminar, Calif. Inst. of Tech., 17 Sep 65.

Descriptors: (*Planetary atmospheres, Mars), (*Mars, Astrophysics), Surfaces.

N66-12992 **Field 3B, 4A**
CFSTI Prices: HC$4.00 MF$0.75
Southwest Center for Advanced Studies, Dallas, Tex.
MULTIDISCIPLINARY RESEARCH IN SPACE-RELATED SCIENCE AND TECHNOLOGY.
Semiannual rept.
30 Sep 65, 101p
Grant NsG-269-62
NASA CR-68362

Descriptors: (*Space enivronmental condition, Scientific research), Planetary atmospheres, Astrophysics, Nuclear particles.

N66-12997 **Field 3A**
CFSTI Prices: HC$2.00 MF$0.50
Iowa State Univ., Iowa City. Dept. of Physics and Astronomy.
LIGHT DENSITY AND COLOR DISTRIBUTION IN THE EARTH'S SHADOW,
by J. E. Hansen and S. Matsushima. Apr 65, 49p
Rept. no. 65-12
NASA CR-68371

Descriptors: (*Lunar eclipse, Analysis), (*Light, Density), (*Colors, Light), Earth, Atmosphere.

N66-13081 **Field 3B, 7D**
CFSTI Prices: HC$3.00 MF$0.75
Melpar, Inc., Falls Church, Va.
THE CHEMISTRY OF COMETS. AN ANNOTATED BIBLIOGRAPHY,
by V. J. De Carlo and J. B. Evans. Mar 65, 61p
Contracts NASw-589, NASw-890
NASA CR-68407

Descriptors: (*Comets, Chemistry), Bibliographics, Photochemistry, Free radicals, Spectroscopy.

N66-13129 **Field 3B, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Aerojet-General Nucleonics, San Ramon, Calif.
METEOROID IMPACT SIMULATION BY MAGNETIC GRADIENT PARTICLE ACCELERATION TECHNIQUES)
Quarterly progress rept., 1 Jul-30 Sep 65,
by R. L. Chapman. 1965, 32p AN-1460
Contract NAS8-11174
NASA CR-68547

Descriptors: (*Meteorites, Simulation), Magnetic field, Impact shock, Acceleration, Particles, Test methods.

N66-13141 **Field 3A, 3B**
CFSTI Prices: HC$2.00 MF$0.50
Ohio State Univ. Research Foundation, Columbus.
OBSERVATIONS MADE OF SUBMILLIMETER-WAVELENGTH SOLAR RADIATION USING THE MCMATH SOLAR TELESCOPE OF THE KITT PEAK NATIONAL OBSERVATORY,
by R. A. Williams. 13 Aug 65, 28p 1093-27
Grant NsG-74-60
NASA CR-68549

Descriptors: (*Submillimeter waves, Solar radiation), (*Solar radiation, Submillimeter waves), Telescopes.

N66-13152 **Field 3B**
CFSTI Prices: HC$1.00 MF$0.50
Smithsonian Institution, Washington, D. C.
A CHONDRULE IN THE CHAINPUR METEORITE,
by K. Fredriksson and A. M. Reid. 1964, 9p
Grants NsG-317-63, NsG-688
NASA CR-68408
Prepared in cooperation with Scripps Inst. of Oceanography, San Diego, Calif.

Descriptors: (*Meteorites, Phase studies), Glass, Liquids, Drops, Cooling, Astrophysics.

N66-13501 **Field 3B, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Maryland Univ., College Park. Dept. of Physics and Astronomy.
LONG WAVELENGTH INVESTIGATIONS OF SOLAR, PLANETARY, AND GALAXY EMISSIONS.
Final rept., 1 May-30 Sep 64,
by W. C. Erickson and M. M. Komesaroff. 1964, 12p
Grant NsG-615
NASA CR-68711

Descriptors: (*Radio astronomy, Extraterrestrial radio waves), (*Extraterrestrial radio waves, Radio astronomy), Antenna arrays, Radio interferometers.

N66-13573 **Field 3C**
CFSTI Prices: HC$2.00 MF$0.50
Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
THE ROTATION OF THE PLANET MERCURY,
by G. Colombo and I. I. Shapiro. 15 Nov 65, 27p
SAO special rept.-188-R
Grant NsG-87-60
NASA CR-68703

Descriptors: (*Mercury (Planet), Rotation).

N66-14387 **Field 3C**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
ON THE HIGH ORDER EFFECTS IN THE METHODS OF KRYLOV- BOGOLIUBOV AND POINCARE,
by P. Musen. Jan 66, 19p NASA-TN-D-3128

Descriptors: (*Celestial mechanics, Mathematical analysis), (*Lunar satellites, Orbital trajectories).

Identifiers: Krylov- Bogoliubov method, Poincare variable.

N66-14388 **Field 3C**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
PLANETARY PERTURBATIONS IN CHEBYSHEV SERIES,
by L. Carpenter. Jan 66, 92p NASA-TN-D-3168

Descriptors: (*Planets, Motion), Perturbation theory.

Identifiers: Chebyshev approximation.

4. ATMOSPHERIC SCIENCES

AD-418 291 **Field 4A**
CFSTI Price: HC$4.60
Honeywell Research Center, Hopkins, Minn.
THE SPECTRAL BRIGHTNESS OF THE NIGHT SKY.
Interim technical rept. no. 1, suppl. 24 Apr-23 Jul 63,
by Paul W. Kruse. 20 Aug 63, 47p
Contract DA-44-009-AMC-168 (T),
Proj. DA-8F23-11-001-07
Supp. to Interim Technical Rept. no. 1, THIN FILM IMAGE CONVERTER.

Descriptors: (*Night sky, Sky brightness), (*Sky brightness, Night sky), Atmosphere, Optical properties.

A survey of the literature on the radiation from the night sky over the wavelength region from 0.4 micron to 20 microns is presented. The major sources of the radiation, including the airglow and the tropospheric thermal emission, are discussed in detail and their angular, diurnal, seasonal, and latitude dependences described. Other sources, including the stars, moon, zodiacal light, aurora, and noctiluscent clouds are discussed. The data are presented in nine figures showing the absolute value of the zenith spectral brightness over several wavelength intervals between 0.4 micron and 20 microns. The relationship between the zenith spectral brightness and the brightness seen by an observer viewing along a horizontal path a vertical plane surface illuminated by the airglow is derived in an appendix. (Author)

AD-459 426 **Field 4A, 20N**
CFSTI Price: HC$1.60
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
IMPROVEMENT OF THE TROPOSPHERIC CORRECTION FOR DOPPLER DATA, BASED ON A STUDY OF UPPER AIR METEOROLOGICAL DATA,
by H. S. Hopfield. Jan 65, 17p TG-646
Contract NOw-62-0604-c

Descriptors: (*Troposphere, Atmospheric refraction), (*Atmospheric refraction, Doppler effect), (*Doppler effect, Atmospheric refraction), Atmospheric models, Mathematical models.

The effect of tropospheric refraction on the Doppler shift has up to now been computed on the basis of a simple quadratic model of the height variation of the refractivity N of air. (N is defined as 100,0000 (n - 1), where n is the index of refraction.) The validity of this model in predicting the correct tropospheric range error for a vertically arriving signal is investigated here. The area under an N vs. height curve obtained from observed upper air data has been compared with the area under the corresponding quadratic profile (which starts at the same surface value of N), for 34 profiles observed at a variety of geographic locations, altitudes and seasons. The results show that the ratio between the tropospheric error due to the quadratic model and that due to the observed refractivity profile is in general not unity but is a linear function of the refractivity at the surface. This relation provides a simple correction factor for improving the computed tropospheric refraction correction for the Doppler shift. (Author)

AD-460 727 **Field 4A, 17H**
CFSTI Price: HC$6.60
Instrumentation Development Directorate, White Sands Missile Range, N. Mex.
RESEARCH ON TERRAIN EFFECTS ON OPTICAL TURBULENCE GENERATION.
Final rept.,
by John A. Roth. Jan 65, 63p STEWS-ID-65-3
Proj. DA-1-A-2-50206-D-241

Descriptors: (*Micrometeorology, Atmospheric refraction), (*Atmospheric refraction, Terrain), (*Terrain, Atmospheric refraction), (*Turbulence, Atmosphere), Atmospheric temperature, Surface area, Lakes, Sand, Deserts, Optical properties, Interference, Optical equipment.

Identifiers: Optical turbulence.

The turbulence-generating potential of various surfaces was investigated by measuring the temperature profile from 0.5 to 24 feet above each surface. Surfaces investigated include sparsely-vegetated desert, a shallow lake, white sand, and vegetation. An attempt was made to determine a quantitative relationship between optical resolution and lapse rate by simultaneously measuring the temperature profile and photographing a target pattern through a 120 cm lens at one of the sites. Results of the temperature-profile measurements indicate that higher lapse rates exist over the vegetation tested than over the desert. The lapse rates over white sand and over water are appreciably lower than that over the desert. Due to the high scatter in the optical data, no mathematical expression for the optical resolution as a function of the lapse rate was determined. However, the results demonstrate that the optical turbulence increases rapidly with increasing lapse rate. Resolution-loss rates as high as twenty lines per millimeter per degree Centigrade temperature-difference, measured between points six inches and eighteen feet above the surface, were recorded. The relationship between the optical resolution and the lapse rate, together with the difference in lapse rate occurring over areas with different surfaces, demonstrate that when selecting a location for optical instrumentation the lapse-rate characteristics of the surface layer should be taken into account. (Author)

AD-468 149 **Field 4A, 20H, 20I, 20N**
CFSTI Prices: HC$3.00 MF$0.75
Avco-Everett Research Lab., Everett, Mass.
A LIMIT ON STABLY TRAPPED PARTICLE FLUXES,
by C. F. Kennel and H. E. Petschek. Jul 65, 65p
Research rept. RR-219
Contracts Nonr-2524 (00), NASw-837

Descriptors: (*Whistlers, Plasma medium), (*Charged particles, Ionosphere), (*Ionosphere, Charged particles), (*Cyclotron resonance phenomena, Ionosphere), Electrons, Ions, Radiofrequency interference, Electromagnetic waves, Propagation, Protons, Electron density, Van Allen radiation belt.

Whistler mode noise leads to electron pitch angle diffusion. Similarly, ion cyclotron noise couples to ions. This diffusion results in particle precipitation into the ionosphere and creates a pitch angle distribution of trapped particles which is unstable to further wave growth. Since excessive wave growth leads to rapid diffusion and particle loss, the requirement that the growth rate be limited to the rate at which wave energy is depleted by wave propagation allows an estimate of an upper limit to the trapped equatorial particle flux. Electron fluxes > 40 ke V and proton fluxes > 120 ke V observed on Explorers XIV and XII respectively obey this limit with occasional exceptions. Beyond $L = 4$, the fluxes are just below their limit, indicating that an unspecified acceleration source sufficient to keep the trapped particles near their precipitation limit exists. Limiting proton and electron fluxes are roughly equal, suggesting a partial explanation for the existence of larger densities of high energy protons than electrons. Observed electron pitch angle profiles correspond to a diffusion coefficient in agreement with observed lifetimes. The required equatorial whistler mode wide band noise intensity, 0.01 gamma is not obviously inconsistent with observations, and is consistent with the lifetime and limiting trapped particle intensity. (Author)

N66-12961 **Field 4A, 20H**
CFSTI Prices: HC$3.00 MF$0.75
California Univ., La Jolla.
HIGH ENERGY PHOTONS AND NEUTRINOS FROM COSMIC SOURCES,
by G. R. Burbidge and R. J. Gould. 1 Apr 65, 95p
Grant NsG-357
NASA CR-68298

Descriptors: (*Photons, Cosmic rays), (*Neutrinos, Cosmic rays), X-rays, Gamma rays.

N66-12993 **Field 4A**
CFSTI Prices: HC$1.00 MF$0.75
Stanford Univ., Calif. Stanford Electronics Lab.
ECCENTRIC GEOPHYSICAL-OBSERVATORY SATELLITE S-49 WITH INTERPRETATION OF THE RADIO-BEACON EXPERIMENT.
Technical rept. no. 1,
by A. V. Da Rosa. Jun 65, 63p SEL-65-063
Contract NASR-136
NASA CR-68307

Descriptors: (*Radio beacons, Geophysics), (*Exosphere, Analysis).

Identifiers: Geophysical satellite.

N66-13086 Field 4A
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
DIFFUSION OF LOW ENERGY AURORAL ELECTRONS IN THE ATMOSPHERE,
by K. Maeda. Jun 64, 31p NASA-TM-X-55023, X-640-64-150

Descriptors: (*Electrons, Diffusion), (*Aurorae, Electrons), Atmosphere.

N66-13126 Field 4A, 20H
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Huntsville, Ala. Marshall Space Flight Center.
AN ENVIRONMENTAL MODEL FOR VAN ALLEN BELT PROTONS,
by W. T. Roberts. 21 Oct 65, 31p
NASA TM-X-53351

Descriptors: (*Van Allen radiation belt, Protons), (*Protons, Van Allen radiation belt), Models (Simulation).

N66-13151 Field 4A
CFSTI Prices: HC$3.00 MF$0.75
Pennsylvania State Univ., University Park. Dept. of Electrical Engineering.
THE THEORY AND EXPERIMENTAL RESULTS OF AN IONOSPHERIC PROBE EXPERIMENT,
by D. S. Hoffman. Jan 66, 77p Scientific-260
Grant NsG-134-61
NASA CR-68459

Descriptors: (*Ionosphere, Atmospheric sounding), Ions, Sounding rockets, Direct current, Temperature, Density, Electrons, Voltage.

N66-13566 Field 4A
CFSTI Prices: HC$3.00 MF$0.75
Southwest Center for Advanced Studies, Dallas, Tex.
THE MULTIPLE IONOSPHERIC PROBE AURORAL IONOSPHERIC REPORT,
by R. L. Bickel, W. Calvert, N. Eaker, J. A. Fejer, and M. Field. Aug 65, 67p DASS-65-2
Contract NSR-44-004-017
NASA CR-68644
Prepared in cooperation with Central Radio Propagation Lab., Boulder, Colo.

Descriptors: (*Ionosphere, Atmospheric sounding), Sounding rockets, Electrical impedance, Probes (Electromagnetic).

Identifiers: Nike-Apache.

N66-13567 Field 4A, 12A
CFSTI Prices: HC$3.00 MF$0.75
Pennsylvania State Univ., University Park. Dept. of Electrical Engineering.
AN APPLICATION OF SAMPLING THEORY TO THE REDUCTION OF IONOGRAMS.
Scientific rept. no. 242,
by R. Vest. 1 Jun 65, 62p
Grant NsG-134-61
NASA CR-68643

Descriptors: (*Ionosphere, Electron density), (*Sampling, Atmosphere models), Atmospheric sounding.

N66-13571 Field 4A
CFSTI Prices: HC$4.00 MF$0.75
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
TURBULENCE NEAR THE 100 KILOMETER LEVEL OF THE UPPER ATMOSPHERE.
Master's thesis,
by C. G. Justus. Nov 65, 113p
Contract AF 19/628-393, Grant NsG-304-63
NASA CR-68708

Descriptors: (*Upper atmosphere, Turbulence).

N66-13605 Field 4A
CFSTI Prices: HC$1.00 MF$0.50
State Univ. of Iowa, Iowa City. Dept. of Physics and Astromomy.
ON THE USE OF ELECTRICAL ION SOURCES FOR ION TRACER EXPERIMENTS IN THE MAGNETOSPHERE,
by E. W. Howes, Jr. Aug 65, 22p Rept. no. 65-31
Grant NsG-233-62
NASA Cr-68502

Descriptors: (*Upper atmosphere, Electric fields).

N66-13632 Field 4B
CFSTI Prices: HC$3.00 MF$0.50
Florida State Univ., Tallahassee. Dept. of Meteorology.
A STUDY OF A NON-DEEPENING TROPICAL DISTURBANCE,
by M. Chaffee, M. Garstang, J. Levine and J. M. Simpson. Aug 65, 59p
Contract DA-AMC-28-043-64G5, Grant NsG-481
NASA CR-68561

Descriptors: (*Tropical cyclones, Analysis).

Identifiers: Tiros VI, Tiros VII.

N66-14711 Field 4A
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
FEASIBILITY OF ACCELERATING MICRON-SIZE PARTICLES IN SHOCK-TUBE FLOWS FOR HYPERVELOCITY DEGRADATION OF REFLECTIVE SURFACES,
by H. Mark and M. J. Mirtich. Jan 66, 36p
NASA-TN-D-3187

Descriptors: (*Particles, Acceleration), (*Hyperovelocity protectiles, Shock tubes).

PB-169 429 Field 4B, 17I
CFSTI Prices: HC$8.60 MF$0.75
Aerospace Corp., El Segundo, Calif. Technical Operations.
FEASIBILITY STUDY OF DOPPLER-DIFFERENCE TRACKING SYSTEM FOR GHOST,
by A. H. Shapiro. Apr 65, 90p ATR-65 (7060)-6
Contract Cwb-10857

Descriptors: (*Meteorological balloons, Doppler systems), (*Doppler systems, Tracking), (*Tracking, Doppler systems), (*Meteorological parameters, Measurement), Feasibility studies, Wind, Velocity, Atmospheric sounding; Meteorological satellites.

Identifiers: GHOST.

The over-all feasibility of a doppler-difference tracking technique in conjunction with the GHOST (Global HOrizontal Sounding Technique) concept is investigated. A specific implementation is postulated and evaluated, and various alternatives of satellite altitudes and frequencies of operation are considered. An error analysis is made to ascertain the accuracy of the balloon position determination, which is prerequisite to the determination of wind velocity. Results of the study indicate that the compatibility of a doppler-difference tracking approach with the GHOST concept is a function of the balloon deployment rates and densities. (Author)

TID-21609 Field 4B, 9B
CFSTI Prices: HC$2.00 MF$0.50
Pennsylvania State Univ., University Park. Coll. of Mineral Industries.
DATA PROCESSING FOR ISENTROPIC ANALYSES.
Technical rept. no. 1,
by Robert T. Duquet. Dec 64, 39p
Contract AT (30-1)-3317

Descriptors: (*Meteorological parameters, Program ming languages), (*Data processing systems, Meteorology).

5. BEHAVIORAL AND SOCIAL SCIENCES

AD-467 120 Field 5I, 20E
CFSTI Prices: HC$1.00 MF$0.50
Space and Information Systems Div., North American Aviation, Inc., Downey, Calif.
LASERS FOR TRAINING DEVICES STUDY.
Bi-monthly progress rept. no. 4.
14 May 65, 12p
Contract N61339-1651

Descriptors: (*Scanning, Training devices), (*Training devices, Lasers), (*Lasers, Training devices), Phase shift, Single crystals, Crystal growth, Refractive index, Electric fields, Integral transforms, Electrooptics.

The report covers three major areas of interest: electrochromism scanning, electro-optic perovskite (KTN) scanning, and the bender bimorph scanner for sawtooth vertical scanning.

AD-469 503 Field 5I, 13H
CFSTI Prices: HC$14.60 MF$1.00
Carnegie Inst. of Tech., Pittsburgh, Pa. Graduate School of Industrial Administration.
THE SCHEDULING OF LARGE PROJECTS WITH LIMITED RESOURCES.
Research memo. (Doctoral thesis),
by Jerome Douglas Wiest. 15 May 62, 143p
ONR-RM-113
Contract Nonr-760 (23),
Proj. NR-047-011

Descriptors: (*Scheduling, Industrial production), (*Management engineering, Scheduling), Models (Simulations), Costs, Feasibility studies, Research program administration, Control sequences, Sequential analysis, Programming (Computers), Digital computers, Manage ment planning, Industrial research, Bibliographies, Operations research, Logistics.

This study was prompted initially by the need for more effective methods of large project scheduling. Because most recent advances in this field have paid little explicit attention to the problem of limited resources, much of the effort was devoted to developing a theoretical system for dealing with project scheduling when resources are scarce. Different types of schedules were classified according to their properties; operations useful for generating and altering schedules extended the concepts of critical path analysis to the limited resource case--including the useful notion of slack. The concept of a critical sequence was developed and several theorems regarding its existence in certain types of schedules were proved.

N66-12959 Field 5E, 22A, 22B
CFSTI Prices: HC$5.00 MF$1.00
American Inst. for Research, Pittsburgh, Pa.

HUMAN FACTORS INFORMATION REQUIREMENTS FOR SPACE SYSTEM DEVELOPMENT.
Final rept.,
by J. W. Altman. Jun 64, 173p
Contract NASR-194
NASA CR-68230
Prepared in cooperation with Inst. for Performance Technology.

Descriptors: (*Human engineering, Spacecraft), (*Space flight, Human engineering), Space probes, Data, Design.

N66-12989 **Field 5A**
CFSTI Prices: HC$2.00 MF$0.50
Alfred P. Sloan School of Management. Mass. Inst. of Tech., Cambridge.
PROBLEM SOLVING STRATEGIES IN PARALLEL RESEARCH AND DEVELOPMENT PROJECTS,
by T. J. Allen. Jun 65, 27p Working Paper-126-65
NASA CR-68375

Descriptors: (*Research program administration, Operations research), Management planning, Multiple operation.

N66-13013 **Field 5B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Washington, D. C.
LISTING OF SPECIAL PUBLICATIONS AND TECH BRIEFS.
Nov 65, 20p

Descriptors: (*Reports, Bibliographies), (*Bibliographies, Reports), Handbooks, Commerce, Industries.

N66-13516 **Field 5H**
CFSTI Prices: HC$3.00 MF$0.75
Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
REPORT OF THE NASA SEMINAR ON PILOT-VEHICLE SYSTEMS IDENTIFICATION,
by J. I. Elkind. 1 Mar 64, 87p Rept. no. 1102
Contract NASw-668
NASA CR-68701
Prepared for presentation at Seminar, Ames Research Center, May 63.

Descriptors: (*Pilots, Man-machine systems), (*Man-machine systems, Statistical analysis), Performance (Human), Statistical processes, Symposia.

N66-13990 **Field 5H**
CFSTI Prices: HC$1.00 MF$0.50
Texas Univ., Austin. Defense Research Lab.
STUDIES OF AUDITORY INFORMATION PROCESSING EMPHASIZING THE APPLICATION OF SIGNAL DETECTABILITY THEORY TO THE AUDITORY SENSORY RESPONSES.
Fifth quarterly progress report no. 5, 1 Jun-31 Aug 65,
by L. A. Jeffress. 15 Oct 65, 6p
Contracts NASA Order R-129, NONR-3579 (04)
NASA CR-68881

Descriptors: (*Auditory signals, Processing).

Identifiers: Auditory information processing.

N66-14151 **Field 5E, 6S**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langeley Station, Va. Langley Research Center.
A WATER-IMMERSION TECHNIQUE FOR THE STUDY OF MOBILITY OF A PRESSURE-SUITED SUBJECT UNDER BALANCED-GRAVITY CONDITIONS,
by H. L. Loats, Jr., G. S. Mattingly, and O. F. Trout, Jr. Jan 66, 34p NASA-TN-D-3054
Prepared in cooperation with S/Environ. Res. Assocs.

Descriptors: (*Pressure suits, Astronauts), (*Weightlessness, Performance (Human)), Gravity, Mobile, Simulation, Test methods.

N66-14904 **Field 5E**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
DESCRIPTION OF LANGLEY LOW-FREQUENCY NOISE FACILITY AND STUDY OF HUMAN RESPONSE TO NOISE FREQUENCIES BELOW 50 CPS,
by P. M. Edge, Jr. and W. H. Mayes. Jan 66, 13p NASA-TN-D-3204

Descriptors: (*Performance (Human), Noise).

PB-169 412 **Field 5B**
CFSTI Prices: HC$1.10 MF$0.50
Davison (P. S.), Dunfermline (Scotland).
RECORDS OF RESEARCH AND DISCOVERY, NEGLECTED ASSETS OF SCIENCE. I. SOME PROBLEMS AND THEIR BACKGROUND,
by P. S. Davison. 1961, 5p
NSF Scientific Documentation Project. Research v14 n4 p159-63 Apr 1961.

Descriptors: (*Documentation, Scientific research), (*Scientific research, Documentation), (*Information retrieval, Great Britain).

This, the first of two articles, is aimed at showing the importance to a modern industrial nation of records of past scientific effort, how the importance of these records is increasing as is their volume, and how the methods of storage and retrieval used for this knowledge must change to fit present conditions and needs. An attempt is made to show how the development of suitable mechanical data handling methods might help shape these changes.

PB-169 415 **Field 5B**
CFSTI Prices: HC$5.00 MF$1.00
General Electric Co., Bethesda, Md. Information Systems Operation.
AN INVESTIGATION OF THE BASIC PROCESSES INVOLVED IN THE MANUAL INDEXING OF SCIENTIFIC DOCUMENTS.
Final rept.,
by Lawrence H. Oliver, Claude Mitchell, Edmund W. Fitzpatrick, and Herbert Jacobson. 11 Feb 66, 196p
Contract NSF-C422
NSF Scientific Documentation Project.

Descriptors: (*Reports, Subject indexing), (*Subject indexing, Reports), State-of-the-art reviews, Problem solving, Decision making, Abstracts.

Identifiers: Thesauri, Indexing terms.

The purpose of the study was to investigate the basic processes involved in the manual indexing of scientific documents in order that: (1) The tasks of indexing scientific documents could be objectively analyzed. (2) A set of guiding principles could be identified regarding the characteristics and qualifications of 'good' indexers. (3) Critical gaps in present knowledge could be identified and experiments recommended to fill these gaps. Two modes of data collection were used: a review of the literature, and structured interviews. The major results of the study included: (1) A comprehensive and detailed description of how indexers manually index scientific documents. (2) The identification of many indexer, task, information, and environmental related factors which are critical to the indexing task. (3) A set of significant factors in regard to those characteristics of an indexer which are highly desirable and which contribute directly to his ability to adequately perform the indexing task are also described. (4) The identification of critical gaps in the data base and the recommendation of three feasible studies designed to fill the gaps. The results of the study point to the fact that little is known about the characteristics of human indexers and how these characteristics are related to the indexing task. (Author)

PB-169 477 **Field 5G**
CFSTI Prices: HC$13.60 MF$1.00
Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
EXPERIMENTAL MACHINE TRANSLATION OF RUSSIAN TO ENGLISH,
Project progress rept.
15 Dec 58, 136p Rept. no. M20-8U13
Contract AF 30(635)-2867

Descriptors: (*Machine translation, Russian language), (*Programming (Computers), Machine translation), Data processing systems, Grammars, Linguistics, Syntax, Punched cards, Programming languages, English language, State-of-the-art reviews.

An operating IBM 704 computer program capable of producing considerably better than 'word for word' translation of Russian physics text has been developed. Translation rules were developed initially as a working hypothesis; these rules were then tested, expanded, and modified as a result of studying 20,000 words of machine translated text. It has been established that the initially hypothesized rules for modifying 'word for word' translation (based on the 'word block' model conceived in the earlier R-W work) provide a sound approach and a good first approximation to the resolution of syntactic ambiguities. Problems of multiple meaning are first minimized by restricting the translation program to a single technical field, then further reduced through hypothesized selection rules, through idiom compilation, and through special context studies of the 22 most frequent multiple-meaning words in a 20,000 word experimental corpus. The computer program has been constructed with adaptability to change as a primary objective. Future work oriented on continual improvement of the program through study of exceptions to a set of largely effective rules in a systematic procedure for experimental translation provides a reasonably clear route to good automatic translation of current Russian physics literature. The report describes firstly the research procedures used and secondly sets forth the translation rules followed in the present program. An example of machine translated text is given. (Author)

PB-169 543 **Field 5B**
CFSTI Prices: HC$6.00 MF$1.25
Federal Aviation Agency, Washington, D. C. Information Retrieval Branch.
THESAURUS OF FAA DESCRIPTORS,
by James T. Murphy. Nov 65, 254p

Descriptors: (*Dictionaries, Information retrieval), (*Information retrieval, United States Government), (*Vocabulary, Information retrieval), Civil aviation, Documentation, Air traffic control systems.

Identifiers: Thesauri, Federal Aviation Agency.

The Thesaurus of FAA Descriptors is based upon the Thesaurus of ASTIA Descriptors (2d ed., 1962). The Thesaurus contains 3,093 descriptors of which 120 are new terms mainly in the field of air traffic control which have been established in the course of indexing reports for the Federal Aviation Information Retrieval System (FAIRS). The Thesaurus is a vocabulary designed to meet special requirements for information retrieval in the field of civil aviation. It will be used by Agency and contractor personnel in assigning descriptors to new technical reports and to other related technical publications. The Thesaurus shall be the basic authority for controlling input into the Ter-

matrex information storage and retrieval system at the Headquarters' Library. Thesaurus Arrangement.

6. BIOLOGICAL AND MEDICAL SCIENCES

ABCC-60-61 **Field 6R, 18C**
CFSTI Prices: HC$3.00 MF$0.75
Atomic Bomb Casualty Commission, Hiroshima (Japan).
ANNUAL REPORT ON ACTIVITIES.
1 Jul 60-30 Jun 61.
30 Jun 61, 91p
Contract AT (49-1)-GEN-72

Descriptors: (*Radiobiology, Medical research), (*Casualties, Nuclear explosions), Japan.

AD-445 863 **Field 6S**
CFSTI Price: HC$2.60
Naval Training Device Center, Port Washington, N. Y.
EMPTY VISUAL FIELD STUDIES: SOME EFFECTS OF CORRECTIVE LENSES, FILTERS, AND STRUCTURE.
Technical rept.,
by Milton S. Katz, Paul A. Cirincione andWilliam Metlay. 22 Jun 64, 28p NAVTRADEVCEN-1H-14

Descriptors: (*Visual acuity, Visual signals), (*Training devices, Visual acuity), (*Visual perception, Degradation), (*Pilots, Visual perception), (*Eye, Exercise), Transfer of training, Per formance (Human), Optical filters, Lenses, Luminescence, Detection, Visibility, Aerial targets.

A visual environment which contains few focusable visual stimuli impairs visual performance ability. Such a visual environment is frequently referred to as an 'empty' or 'homogeneous' visual environment or as a Ganzfeld and a number of studies of its effects have been conducted. The present research is an exploration of some of the effects of optical lens and filter aids to determine whether training devices, aids, or training regimes can reduce or eliminate accidents due to the phenomenon.

AD-465 913 **Field 6A, 6E**
CFSTI Prices: HC$3.00 MF$0.75
Virginia Univ., Charlottesville. Biochemical Lab.
STUDIES IN RED CELL PRESERVATION.
Final rept., 1 Apr 64-30 Jun 65,
by Alfred Chanutin. 30 Jun 65, 90p
Grant DA-MD-49-193-64-G133

Descriptors: (*Blood cells, Preservation), (*Hemoglobin, Preservation), (*Preservation, Blood cells), Phosphorylation, Phosphates, Electrophoresis, Complex compounds, Adenine, Nucleosides, Organic phosphorus compounds, Storage, Ion exchange, pH, Adenosine phosphates, Freezing, Glycerols, Glucose.

Identifiers: Adenosine, Inosine, Dimethyl sulfoxide.

Electrophoretic studies show that tri-, tetra-, and hexaphosphates form complexes with hemoglobin. The absolute and percentage values for Component B and organic phosphate from the same hemolysate of stored ACD and CPD bloods supplemented with adenine, adenosine, inosine, and mixtures of these compounds were determined. The regression lines would approach the zero intercept if the high values for Component B and organic phosphate were not included. Nevertheless, the correlation coefficients are high for anaerobically and aerobically stored bloods. The organic phosphate compounds in the washed red cells of bloods supplemented with adenine, adenosine, or inosine and stored at 4C for 6 weeks were determined at 2-week intervals by anion exchange analysis. These bloods were collected in ACD and CPD and stored anaerobically and aerobically. Under aerobic conditions, the pH values are greater. The highest diphosphoglycerate (DPG) values are observed in the adenosine-supplemented bloods, particularly when the pH is high. The concentrations of ATP and sigma-adenine are greatest in ACD bloods, particularly when supplemented with adenine. No consistent relationship exists between pH and DPG or ATP concentrations. Evidence is presented that methemoglobin is a 'denaturation' product of hemoglobin when red cells are frozen at -20C. (Author)

BNL-7767 **Field 6A, 6C, 6E**
CFSTI Prices: HC$2.00 MF$0.50
European Atomic Energy Community, Brussels (Belgium).
RNA SYNTHESIS IN CHROMATIN AND IN THE NUCLEOLUS OF HELA-S3 HUMAN CANCER CELLS IN CULTURE,
by L. E. Feinendegen and V. P. Bond. 1963, 37p3
Contract AT (30-2)-GEN-16

Descriptors: (*Ribonucleic acids, Synthesis (Chemistry)), (*Cancer, Cells (Biology)).

BNWL-122 **Field 6R, 18H, 18B**
CFSTI Prices: HC$6.00 MF$1.25
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
HANFORD BIOLOGY RESEARCH.
Annual rept. for 1964,
by R. C. Thompson and S. W. Woods. Jan 65, 229p
Contract AT (45-1)-1830

Descriptors: (*Radiobiology, Radiation effects), (*Radioactivity, Biology), Radioactive isotopes.

CONF-640909-10 **Field 6H**
CFSTI Prices: HC$2.00 MF$0.50
Bureau of Commercial Fisheries, Seattle, Wash. Technological Lab.
RADIATION PRESERVATION OF FISH AND SHELLFISH OF THE NORTHEAST PACIFIC AND GULF OF MEXICO,
by John A. Dassow and David Miyauchi. 19 Oct 64, 31p Conf-64-168-4
Presented at International Conference on Radiation Preservation of Foods, Boston, 27-30 Sep 1964.

Descriptors: (*Seafood, Preservation), (*Irradiated foods, Seafood).

CONF-813-1 **Field 6R**
CFSTI Prices: HC$2.00 MF$0.50
Division of Biology and Medicine (AEC), Washington, D. C.
A PREDICTION OF EARLY RADIATION LETHALITY USING AN EFFECTIVE DOSE,
by Hal Hollister, A. R. Vincent, and John W. Cable. Sep 64, 38p TAB-R-4
Presented at International Meeting of the Western Section of the Operations Research Society of America, Honolulu, Sept. 1964.

Descriptors: (*Whole body irradiation, Lethal dosage), (*Lethal dosage, Radiobiology).

COO-119-231 **Field 6R**
CFSTI Prices: HC$5.00 MF$1.00
Utah Univ., Salt Lake City. Coll. of Medicine.
RESEARCH IN RADIOBIOLOGY. ANNUAL REPORT OF WORK IN PROGRESS ON THE CHRONIC TOXICITY PROGRAM.
by Thomas F. Dougherty. 30 Sep 64, 173p
Contract AT (11-1)-119

Descriptors: (*Radiobiology, Laboratory animals), (*Radiological dosage, Injection (medicine)).

N66-12533 **Field 6F, 6M**
CFSTI Prices: HC$2.00 MF$0.50
Melpar, Inc., Falls Church, Va.
DETERMINATION AND MICROBIAL SURVIVAL OF CRYOGENIC WHOLE AIR SAMPLING CONDITIONS.
Contractor rept.
Dec 65, 40p
Contract NAS5-9529
NASA CR-354

Descriptors: (*Microorganisms, Upper atmosphere), (*Collecting methods, Microorganisms), Cryogenics, Shock waves, Test methods.

N66-13089 **Field 6S**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Los Angeles. Brain Research Inst.
MONITORING BRAIN FUNCTION AND PERFORMANCE IN THE PRIMATE UNDER PROLONGED WEIGHTLESSNESS.
Final rept., 15 Aug 63-14 Aug 64,
by W. R. Adey and J. D. French. 1964, 21p
Grant NsG-515
NASA CR-68413

Descriptors: (*Brain, Weightlessness), (*Weight lessness, Performance (Human)), Primates.

N66-13095 **Field 6M**
CFSTI Prices: HC$2.00 MF$0.50
Melpar, Inc., Falls Church, Va.
DETERMINATION AND MICROBIAL SURVIVAL OF CRYOGENIC WHOLE AIR SAMPLING CONDITIONS.
Final rept., 27 Dec 64-27 Jul 65.
1965, 47p
Contract NAS5-9529
NASA CR-68421

Descriptors: (*Microorganisms, Upper atmosphere), (*Upper atmosphere, Sampling).

N66-13097 **Field 6S**
CFSTI Prices: HC$1.00 MF$0.50
Naval School of Aviation Medicine, Pensacola.
OTOLITH ORGAN ACTIVITY WITHIN EARTH STANDARD, ONE-HALF STANDARD, AND ZERO GRAVITY ENVIRONMENTS,
by A. Graybiel, R. S. Kellogg, and E. F., Miller, II. 4 Aug 65, 14p NASM-943, 119
Contract NASA Order R-93
NASA CR-68391

Descriptors: (*Vestibular apparatus, Weightless ness), Gravity, Stress (Physiology), Ear.

N66-13114 **Field 6K**
CFSTI Prices: HC$2.00 MF$0.50
TRW Equipment Labs., Cleveland, Ohio.
CARBON DIOXIDE CONCENTRATION SYSTEM.
Interim rept. no. 1,
by A. D. Babinsky, D. L. De Respiris, andS. J. Derezinski. 30 Nov 65, 48p TRW-ER-6661-1
Contract NAS3-7638
NASA CR-54849

Descriptors: (*Spacecraft cabins, Atmosphere), (*Atmosphere, Purification), Carbon dioxide.

N66-13165 Field 6S, 5I
CFSTI Prices: HC$1.00 MF$0.50
Public Health Service, Washington, D. C.
A LONGITUDINAL STUDY OF NAVAL FLIGHT STUDENTS WITH PARTICULAR ATTENTION TO CARDIOVASCULAR DISEASE.
Progress rept no. 3, 1 Apr-30 Sep 65,
by S. Fox. 1965, 20p
Contract NASA Order R-136
NASA CR-68541

Descriptors: (*Cardiovascular diseases, Aviation personnel), (*Respiratory diseases, Aviation personnel), Students.

N66-13560 Field 6S
CFSTI Prices: HC$1.00 MF$0.50
Naval School of Aviation Medicine, Pensacola, Fla.
PERCEPTION OF THE VISUAL HORIZONTAL IN NORMAL AND LABYRINTHINE DEFECTIVE SUBJECTS DURING PROLONGED ROTATION,
by B. Clark and A. Graybiel. 8 Jul 65, 10p
NSAM-936, 116
Contract NASA Order-R-93
NASA CR-68659

Descriptors: (*Visual perception, Rotation), Illusions, Gravity.

N66-13830 Field 6C
CFSTI Prices: HC$2.00 MF$0.50
Chicago Univ., Ill. Dept. of Biophysics.
INVESTIGATIONS IN SPACE-RELATED MOLECULAR BIOLOGY, INCLUDING CONSIDERATIONS OF THE MOLECULAR ORGANIZATION OF EXTRATERRESTRIAL MATTER.
Technical progress rept,
by H. Fernandez-Moran. 1965, 31p
Grant NsG-441-63
NASA CR-68844

Descriptors: (*Space biology).

Identifiers: Molecular biology.

N66-13831 Field 6D
CFSTI Prices: HC$7.00 MF$2.00
Teledyne Systems Corp., Hawthorne, Calif.
RESEARCH IN ADVANCED CONCEPTS IN BIOTECHNOLOGY, HUMAN ANALOGS, AND BIONICS.
Final rept.
30 Oct 64, 324p
Contract NASw-780
NASA CR-68777

Descriptors: (*Bionics, Analysis).

Identifiers: Human analogs, Biotechnology.

N66-13833 Field 6O
CFSTI Prices: HC$1.00 MF$0.50
Naval School of Aviation Medicine, Pensacola, Fla.
A COMPARISON OF EFFECTIVENESS OF SOME ANTIMOTION SICKNESS DRUGS USING RECOMMENDED AND LARGER THAN RECOMMENDED DOSES AS TESTED IN THE SLOW ROTATION ROOM,
by A. Graybiel, R. S. Kennedy and C. D. Wood.
16 Aug 65, 12p NSAM-945
Contract NASA Order R-93
NASA CR-68858

Descriptors: (*Antimotion sickness agents, Effectiveness).

N66-13899 Field 6F
CFSTI Prices: HC$5.00 MF$1.00
National Aeronautics and Space Administration, Washington, D. C.
SIGNIFICANT ACHIEVEMENTS DURING SIX YEARS OF SPACE BIOSCIENCE RESEARCH AND APPLICATIONS, 1958 - 1964.
Jan 65, 157p NASA-TM-X-57051

Descriptors: (*Space biology).

Identifiers: Exobiology.

N66-14160 Field 6S, 6F, 5J
CFSTI Prices: HC$1.00 MF$1.00
National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY BIBLIOGRAPHY WITH INDEXES, NOV. 1965.
Dec 65, 129p NASA-SP-7011/18/

Descriptors: (*Space biology, Bibliographies), (*Space medicine, Bibliographies), Aviation medicine, Space environmental conditions, Stress (Physiology), Stress (Psychology).

N66-14905 Field 6M
CFSTI Prices: HC$3.00 MF$0.75
Space-General Corp., El Monte, Calif.
PHOTOSYNTHETIC HALOPHILES FROM OWENS LAKE.
Final rept.,
by R. W. Tew. Jan 66, 71p
Contract NASw-1037
NASA CR-361

Descriptors: (*Bacteria, Photosynthesis), (*Sodium compounds, Bacteria), Chlorides, Growth.

Identifiers: Halophiles.

ORINS-51 Field 6R, 18D
CFSTI Prices: HC$3.00 MF$0.50
Oak Ridge Inst. of Nuclear Studies, Inc., Tenn.
THE DESIGN OF A LOW-BACKGROUND WHOLE-BODY COUNTING FACILITY,
by A. C. Morris, Jr. and D. A. Ross. Jan 66, 51p
Contract AT-40-1-GEN-32

Descriptors: (*Whole body irradiation, Crystal counters), (*Crystal counters, Shielding).

ORNL-P-1212 Field 6A
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
NADH PEROXIDASE.
by M. I. Dolin. 1965, 31p CONF-650609-1
Contract W-7405-eng-26
Prepared for presentation at Symposium on Flavins and Flavoproteins, Amsterdam.

Descriptors: (*Peroxidase, Symposia), (*Enzymes, Purification).

ORNL-P-67 Field 6C, 6A
CFSTI Prices: HC$1.00 MF$0.50
Oak Ridge National Lab., Tenn.
MITOCHONDRIAL DIVISION IN PHYTOHAEMAGGLUTININ-STIMULATED HUMAN LYMPHOCYTES,
by Hiroshi Yamamoto. 1963, 16p
Contract W-7405-eng-26

Descriptors: (*Lymphocytes, Mitochondria), (*Mitochondria, Cell division).

ORNL-P-81 Field 6R
CFSTI Prices: HC$1.00 MF$0.50
Oak Ridge National Lab., Tenn.
THIRTY-DAY MORTALITY OF ACUTELY X-IRRADIATED GERMFREE ICR MICE,
by H. I. Walburg, Jr., E. I. Mynatt, andD. M. Robie. 1961, 14p
Contract W-7405-eng-26

Descriptors: (*Radiation effects, Mortality rates), (*Radiation sickness, Mice).

PB-169 440 Field 6H
CFSTI Price: HC$1.60
Wright Air Development Center, Wright-Patterson AFB, Ohio. Aero Medical Lab.
EFFECT OF ALTITUDE AND OXYGEN UPON TASTE.
Technical rept.,
by Beatrice Finkelstein and Robert G. Pippitt.
Apr 57, 15p
WADC TR-57-261,
AD 118 245

Descriptors: (*Food dispensing, Military require ments), (*Taste, Sensitivity), (*Food, Acceptability), Altitude, Oxygen.

Effects of breathing 100% aviator's oxygen at a simulated altitude of 25,000 feet upon the taste sensitivity of young, adult males are presented. The study was performed to determine whether taste perception levels, taste identification levels, or ability to identify tastes are affected by altitude or breathing pure oxygen. Motivation for this study was derived from differences noted in food acceptability on the ground and in high altitude flight situations. No effects of either altitude or breathing pure oxygen on primary taste sensations were found which could account for these differences. An inability to identify tastes both on the ground and at altitude was observed. From the results of this study, one can conclude that field taste test procedures should not include questions that assume a subject's ability to identify the primary tastes. This is particularly true of sour and bitter. For a true evaluation of these two tastes, a trained taste panel is necessary. (Author)

RFP-462 Field 6R, 18D
CFSTI Prices: HC$1.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
THE ROCKY FLATS BODY COUNTER,
by V. P. Johnson. 12 Nov 65, 11p
Contract AT (29-1)-1106

Descriptors: (*Humans, Radiation measurement systems), (*Radiation measurement systems, Radiobiology), Health physics.

TID-13358 Field 6F, 18H, 6R
CFSTI Prices: HC$2.50 MF$1.00
Division of Biology and Medicine (AEC), Washington D. C.
OFFSITE ECOLOGICAL RESEARCH OF THE DIVISION OF BIOLOGY AND MEDICINE,
by Vincent Schultz. Mar 65, 134p

Descriptors: (*Plants (Botany), Radiation effects), (*Animals, Radiation effects), Ecology.

TID-21591 Field 6R
CFSTI Prices: HC$1.00 MF$0.50
Institut Pasteur, Paris (France).
PROGRESS REPORT ON MECHANISM OF LETHAL AND MUTAGENIC ACTION OF IONIZING RADIATION IN E. COLI AND YEAST.
1964, 11p
Contract AT (30-1)-2803

Descriptors: (*Escherichia coli, Radiation effects), (*Yeasts, Radiation effects).

TID-21608 Field 6R, 6C
CFSTI Prices: HC$1.00 MF$0.50
Turku Univ. (Finland).

THE BROOD-PATTERNS OF MUTATIONS AND CROSSING-OVER RECOMBINANTS IN SUCCESSIVE BROODS OF F 1 OFFSPRING FROM MALES TREATED WITH 3000 R OF X-RAYS.
Rept. for 1 Nov 59 - 31 Oct 64,
by Aloha Hannah-Alava. 1964, 3p
Contract AT (30)-2690

Descriptors: (*Drosophila, Radiation effects), (*Mutations, Drosophila).

TID-21649 **Field 6C, 6R**
CFSTI Prices: HC$3.00 MF$0.75
Pavia Univ. (Italy). Istituto di Genetica.
INVESTIGATIONS OF MUTABILITY OF POLYGENES AND ON UTILIZATION OF INDUCED GENETIC VARIABILITY,
by R. E. Scossiroli. 1 Jan 65, 57p
Contract IAEA 61/US

Descriptors: (*Plants (Botany), Mutations), (*Genetics, Plants (Botany)), Radiation effects.

7. CHEMISTRY

AD-446 343 **Field 7E, 18B, 18G**
CFSTI Price: $1.00
Army Nuclear Defense Lab., Edgewood Arsenal, Md.
RADIOCHEMISTRY OF PLUTONIUM AND URANIUM IN SOIL,
by Ralph F. Benck, Robert J. Smith, John Bogdan, Henry Lada, and Henry Mortko. Jun 64, 24p
NDL-SP-7
Proj. DASA-10.005
N64 -30586

Descriptors: (*Soils, Radioactive isotopes), (*Plutonium, Radiochemistry), (*Uranium, Radio chemistry), Fission products, Microanalysis, Ion exchange, Alpha counters, Scintillation counters, Fluorometers.

Methods for the analysis of trace (microgram) quantities of plutonium and uranium by ion-exchange separation from fission products and soil constituents are presented. The plutonium is measured, either by alpha counting electroplated-stainless-steel-disks with a thin window counter, or by liquid scintillation counting of the elutant from the ion-exchange step. The uranium is determined fluorometrically. (Author)

AD-462 323 **Field 7C, 11I**
CFSTI Price: HC$2.60
State Univ. of Iowa, Iowa City.
HIGH TEMPERATURE POLYMERS FROM 1,3DIPOLAR ADDITION REACTIONS.
Quarterly progress rept. no. 1, 1 Feb-30 Apr 65. 30 Apr 65, 24p
Contract DA-11-070-AMC-832 (W),
Proj. DA-5025.11.84203
N65 29693

Descriptors: (*Heat-resistant plastics, Stability), (*Polymers, Polarization), Polymerization, Chemical reactions, Nitriles, N-heterocyclic compounds, O-heterocyclic compounds, Ketones, Aromatic compounds, Polycyclic compounds, Amino plastics, Amino acids, Oxides, Amines.

Identifiers: Dipolar addition reactions.

The scope of 1,3-dipolar addition reactions which may be employed as propagation reactions in polymerization, and a survey of what is known about these reactions is presented. An outline of the proposed research utilizing these reactions is included. The synthesis of p-phenylene-3,3'-disydnone and the model reaction of this double 1,3-dipolarophile with phenyl acetylene has been carried out. The synthesis of a bis-nitrileimine precursor, and two double dipolarophiles has been accomplished. (Author)

AD-465 985 **Field 7E**
CFSTI Prices: HC$3.00 MF$0.50
Sperry Rand Research Center, Sudbury, Mass.
FLUORESCENT ION INTERACTION.
Semiannual technical rept. for period ending 31 May 65,
by William W. Holloway, Jr., Michael Kestigian, andEarl W. Prohofsky. 31 May 65, 57p SRRC-RR-65-51
Contract Nonr-4127 (00), ARPA Order-306-62,
Proj. DEFENDER

Descriptors: (*Fluorescence, Ions), (*Rare earth elements, Fluorescence), (*Manganese, Fluores cence), Thermal properties, Quenching (Inhibition), Impurities, Magnetic properties, Band spectrum, Nickel, Dysprosium, Terbium, Tungstates, Uranyl radicals, Manganese compounds, Fluorides.

Identifiers: Defender project, Manganese potassium fluoride, Manganese rubidium fluoride, Manganous fluoride, Sodium tungstate.

Studies were continued on the interactions between rare-earth ions which affect the fluorescent properties, and on the implications of investigations of the temperature-dependent changes in the fluorescence of concentrated manganese systems. In addition, preliminary experiments were performed on the temperature-dependent fluorescence quenching processes for both rare-earth ions and manganese ions.

AD-466 061 **Field 7E, 11G**
CFSTI Prices: HC$3.00 MF$0.75
American Cyanamid Co., Stamford, Conn. Central Research Div.
CHEMILUMINESCENT MATERIALS.
Technical rept. no. 8, 1 Mar-31 May 65,
by M. M. Rauhut. 30 Jun 65, 84p Rept. no. 06-1432-25-Q8
Contract Nonr-4200 (00), ARPA Order-299,
Proj. NR-356-452
See also AD-610 435.

Descriptors: (*Chemiluminescence, Materials), (*Photochemistry, Chemiluminescence), Halogenated hydrocarbons, Oxychlorides, Hydrogen peroxide, Oxalic acids, Anhydrides, Acridines, Chlorine compounds, Nitriles, Luminescence, Fluorescence, Reaction kinetics, Anthracenes, Ethylenes.

Identifiers: Chlorocarbonyl acridinium chlorides, Oxalic anhydrides, Oxalyl chloride, Quantum yield.

Progress in determining mechanisms of processes fundamental to chemiluminescence is reported with particular reference to the chemiluminescent systems (1) oxalyl chloride-hydrogen peroxide-fluorescer, (2) acyl-oxalic anhydride-hydrogen peroxide-fluorescer, (3) 9-chlorocarbonylacridinum salt-hydrogen peroxide, (4) tetracyanoethylene-hydrogen peroxide-fluorescer. Exploratory searches for new chemiluminescent materials are also reported. (Author)

AD-466 316 **Field 7C**
CFSTI Prices: HC$1.60 MF$0.50
Space-General Corp., El Monte, Calif.
DIBORANE-4-POLYMER,
by Robert E. Williams and F. James Gerhart. 6 Jun 65, 15p Technical rept. TR-8
Contract Nonr-4381 (00),
Proj. NR-356-461

Descriptors: (*Diboranes, Polymers), Borohydrides, Exchange reactions, Nuclear magnetic resonance, Reaction kinetics.

Identifiers: Diborane-4-polymer.

Dehydroboration of tetraborane-10 with excess trialkylboron produces diborane-4-polymer (B2H4)n, and tetralkyldiborane-6. Dehydroboration by boron and aluminum alkyls and alkyl hydrides may pressage a new method of effecting boron hydride interconversions. (Author)

AD-466 669 **Field 7D, 7C**
CFSTI Prices: HC$1.00 MF$0.50
RIAS, Inc., Baltimore, Md.
THEORETICAL AND QUANTUM CHEMISTRY OF N, O, F COMPOUNDS.
Quarterly technical rept. no. 5, 9 Apr-9 Jul 65,
by Joyce J. Kaufman. 9 Jul 65, 12p
Contract DA-31-124-ARO (D)-203, ARPA Order-542,
Proj. AROD-5084-C
See also AD-280 284 (NASA N65-24827).

Descriptors: (*Nitrogen compounds, Molecular orbitals), (*Fluorine compounds, Molecular orbitals), (*Oxidizers, Molecular orbitals), (*Molecular orbitals, Oxidizers), Oxygen compounds, Chemical bonds, Programming (Computers), Hydrogen, Helium, Fluorides, Ions, Molecular energy levels, Integrals, Potential theory.

Identifiers: Helium difluoride, Nitrogen fluorides.

The extended Huckel molecular orbital (XHMO) program is being extended to include a general overlap routine and to introduce d-orbitals into the projection routine. As a means of interpreting the XHMO method as a semi-empirical approximation to the Hartree-Fock (H-F) theory two methods of parametrization are being investigated. XHMO theory is being investigated for its applicability in generating approximate H-F reaction surfaces. As an example the H + H2 system is being used. Tentative XHMO calculations on HeF2 indicate that the system is unstable. Several improvements were made to the polyatom system. NF2 (+) and NF2 (-) were run successfully with small basis sets. Cis-N2F2 was calculated with a 5s + 2p basis. Research has commenced on studying methods of integral evaluation routines for Slater orbitals to substitute in place of Gaussian orbitals in the polyatom system.

AD-466 906 **Field 7D**
CFSTI Prices: HC$1.00 MF$0.50
Coates Chemical Lab., Louisiana State Univ., Baton Rouge.
EFFECT OF TETRAALKYLAMMONIUM HYDROXIDES ON THE ELECTRODE KINETICS OF THE CHROMI-CHROMOCYANIDE COUPLE,
by Anna Maria Giuliani. May 65, 14p Technical rept. TR-58
Contract Nonr-1575 (04),
Proj. NR-051-258

Descriptors: (*Chromium, Electrodes), (*Electrodes, Reaction kinetics), (*Ammonium compounds, Electrolytes), (*Electrolytes, Ammonium compounds), Chromium compounds, Cyanides, Electrical impedance, Ions, Concentration (Chemistry), Recombination re actions, Electrical double layer, Electrochemistry, Hydroxides.

Identifiers: Electrode kinetics, Tetrabutyl ammonium hydroxides, Tetraethyl ammonium hydroxides, Tetramethyl ammonium hydroxides, Tetrapropyl ammonium hydroxides.

The kinetics of the chromi-chromocyanide couple was studied by the faradaic impedance method for a varying supporting electrolyte concentration. The effect of tetraalkylammonium hydroxide was investigated at constant ionic concentration for the methyl, ethyl, n-propyl and n-butyl hydroxides. Data are interpreted on the basis of coverage and double layer effects and ionic association. (Author)

C13.44-87 **Field 7C**
CFSTI Price: MF$0.75
National Bureau of Standards, Washington, D. C. Inst. for Materials Research.

OXIDATION OF POLYCYCLIC, AROMATIC HYDROCARBONS: A REVIEW OF THE LITERATURE,
by R. Stuart Tipson. 17 Sep 65, 58p NBS Monograph-87
Availability: Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.40.

Descriptors: (*Aromatic compounds, Oxidation), (*Polycyclic compounds, Oxidation), Oxidizers, Molecular structure, Chemical bonds, Decomposition, Reviews.

A survey was made of the literature on the oxidation of polycyclic, aromatic hydrocarbons. Information has been assembled on (1) the oxidants effective in the oxidation of such hydrocarbons, (2) the relative reactivity of the hydrocarbons, (3) the conditions under which oxidation proceeds, (4) the chemical mechanisms involved when such oxidations occur, and (5) the products formed. (Author)

C13.46:248 **Field 7E, 7B, 6A**
CFSTI Price: MF$0.75
National Bureau of Standards, Washington, D.C. Radiochemical Analysis Section.
RADIOCHEMICAL ANALYSIS: ACTIVATION ANALYSIS, INSTRUMENTATION, RADIATION TECHNIQUES, AND RADIOISOTOPE TECHNIQUES, JULY 1963 TO JUNE 1964.
Technical note,
by James R. DeVoe. 1964, 97p NBS-TN-248
Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.50.

Descriptors: (*Radiochemistry, Chemical analysis), (*Radioactivation analysis, Reviews), (*Laboratory equipment, Reviews), (*Nuclear spectroscopy, Reviews), (*Radioactive isotopes, Reviews), Radiochemistry laboratories, Clean rooms, Gamma-ray spectroscopy, Pulse height analyzers, Silver, Cobalt, Mossbauer effect, Nuclear transformations, Lungs, Instrumentation.

The summary of progress of the Radiochemical Analysis Section of the Analytical Chemistry Division at NBS covers four areas: Activation Analysis, Instrumentation, Radiation Techniques, and Radioisotope Techniques. The present facilities including a radiochemical laboratory and a clean room facility are described and future plans for the 10 megawatt nuclear reactor and the 100 Mev Linac facilities at the new Bureau site are outlined. A teletypewriter-pulse-height analyzer interface for more efficient data handling in gamma-ray spectroscopy is described. A combination of radioisotope dilution and radiometric methods for determining trace amounts of silver and cobalt is presented. Details of a drift-free Mossbauer spectrometer which utilizes positive synchronization of a pulse-height analyzer with an electro-mechanical drive are given. Reproducible response to better than 0.5% is obtained. An apparatus for the measurement of the energy of nuclear species recoiling from clean metal surfaces in ultrahigh vacuum is described. The application of neutron activation analysis for determination of ppm levels of copper and zinc in human lung tissue is discussed. (Author)

EURAEC-1273 **Field 7E**
CFSTI Prices: HC$3.00 MF$0.50
Societa Ricerche Impianti Nucleari, Milian, (Italy).
DETERMINATION OF TRACE-ELEMENTS IN IRON SAMPLES BY NEUTRON-ACTIVATION TECHNIQUES.
Technical rept. no. 2.
Nov 64, 54p R/352
Contract 004-63-10 TEEI (RD)

Descriptors: (*Iron, Impurities), (*Neutron activation, Iron), Chemical analysis.

KY-L-379 **Field 7A, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Paducah Gaseous Diffusion Plant, Ky.
FLUID BED ASH RECOVERY. PADUCAH PLANT LABORATORY, JUNE-AUGUST 1961,
30 Dec 64, 18p
Contract W-7405-eng-26

Descriptors: (*Fluidized bed processes, Uranium), (*Uranium, Recovery).

N66-13084 **Field 7D**
CFSTI Prices: HC$2.00 MF$0.50
National Bureau of Standards, Boulder, Colo.
A COMPILATION OF THE PROPERTY DIFFERENCES OF ORTHO AND PARA HYDROGEN OR MIXTURES OF ORTHO AND PARA HYDROGEN,
by J. G. Hust and R. B. Stewart. 20 May 65, 40p NBS-8812
Contract NASA Order R-45
NASA CR-68456

Descriptors: (*Hydrogen, Chemical properties).

Identifiers: Para hydrogen, Ortho hydrogen.

N66-13094 **Field 7D, 7C**
CFSTI Prices: HC$3.00 MF$0.75
Stanford Univ., Calif. Instrumentation Research Lab.
AN INVESTIGATION OF THE MASS SPECTRA OF TWENTY-TWO FREE AMINO ACIDS,
by N. Martin. 21 Sep 65, 62p IRL-1035
Grants NsG-81-60, NB-04270
NASA CR-68432
Prepared in cooperation with AFOSR, Grant AF-AFOSR-885-65.

Descriptors: (*Amino acids, Mass spectroscopy), (*Mass spectroscopy, Amino acids), Identification.

N66-13161 **Field 7C, 11I**
CFSTI Prices: HC$3.00 MF$0.75
Notre Dame Univ., Ind. Dept. of Chemistry.
FUNDAMENTAL STUDIES ON THE SYNTHESIS OF HEAT-RESISTANT POLYMERS. THE SYNTHESIS AND EVALUATION OF POLYMERIC SCHIFF BASES FROM XYLYLIDENE TETRAALKYL ETHERS.
Progress rept. no. 7, 31 Jan-15 Sep 65,
by G. F. Dalelio. 15 Sep 65, 96p
Grant NsG-339
NASA CR-68584

Descriptors: (*Polymerization, Heat-resistant plastics), (*Amines, Aromatic compounds), Synthesis (Chemistry).

N66-13499 **Field 7C, 18H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
POLY (IMIDAZOPYRROLONES) - A NEW CLASS OF RADIATION RESISTANT POLYMERS,
by V. L. Bell and G. F. Pezdirtz. 1965, 11p
NASA-TM-X-57034

Descriptors: (*Polymers, Synthesis (Chemistry)), (*Radiation damage, Polymers), Pyrroles, Hetero cyclic compounds.

Identifiers: Polyimidazopyrrolones.

N66-13991 **Field 7D**
CFSTI Prices: HC$3.00 MF$0.50
Tyco Labs., Inc., Waltham, Mass.
DEVELOPMENT OF CATHODIC ELECTROCATALYSTS FOR USE IN LOW TEMPERATURE H2/ O2 FUEL CELLS WITH AN ALKALINE ELECTROLYTE.
Quarterly report no. 1, 1 Jul-30 Sep 65,
by J. Giner, A. C. Makrides, and R. J. Jasinski. 1965, 59p
Contract NASw-1233
NASA CR-68891

Descriptors: (*Fuels cells, Catalysts).

N66-14759 **Field 7D**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
ARGENTIC OXYSALT ELECTRODES,
by H. F. Leibecki. Jan 66, 15p NASA-TN-D-3208

Descriptors: (*Electrodes, Materials), Zinc, Silver, Potassium compounds, Hydroxides.

N66-14906 **Field 7D**
CFSTI Prices: HC$3.00 MF$0.50
Lockheed Missiles and Space Co., Palo Alto, Calif.
ELECTROLYTIC PREPARATION OF HIGH DIELECTRIC THIN FILMS,
by A. E. Hultquist and M. E. Sibert. Jan 66, 57p

Contract NASw-969
NASA CR-364

Descriptors: (*Thin films, Electrolysis), Dielectrics, Barium compounds, Titanites.

ORNL-3904 **Field 7B, 7C, 7D, 7E, ;**
CFSTI Prices: HC$3.00 MF$0.75
Oak Ridge National Lab., Tenn.
INDEXES TO THE ANALYTICAL CHEMISTRY DIVISION ANNUAL PROGRESS REPORTS, 1964-1965,
by Helen P. Raaen and Ann K. Haas. Jan 66, 72p
Contract W-7405-eng-26

Descriptors: (*Documentation, Chemical analysis), (*Chemical analysis, Indexes).

PB-169 157 **Field 7E, 7C**
CFSTI Prices: HC$3.00 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
SYNTHESE D'UN HYDROCARBURE AROMATIQUE POLYCYCLIQUE MARQUE AU CARBONE 14: LE DIBENZO (b, d e f) CHRYSENE 14C-7,14 (SYNTHESIS OF A POLYCYCLIC AROMATIC HYDROCARBON MARKED WITH CARBON-14: (b, d e f) DIBENZOCHRYSENE (14)C-7, 14),
by Gerard Chatelain. Dec 65, 70p CEA-R-2858
Text in French; Attached Summary in English.

Descriptors: (*Labeled substances, Synthesis (Chemistry)), (*Polycyclic compounds, Labeled substances), Aromatic compounds, Hydrocarbons, Carbon dioxide, Bromine compounds, Naphthalenes, Purification, Chromatographic analysis, Radio active isotopes, Carbon, Friedel-Crafts reactions, Dehydrogenation, France.

Identifiers: Dibenzo pyrenes.

The compound (b, d e f) dibenzo-chrysene, labelled with C14 at C-7 and C-14, was synthesized from radio-active carbon dioxide and the organic magnesium compound derived from 1,5 dibromo naphthalene. The product was purified by a very precise series of fractionated chromatographs on alumina having a chromatographic activity. This necessitated the development of a special technique. (Author)

PB-169 159 **Field 7B, 7E**
CFSTI Prices: HC$2.00 MF$0.50
Commissariat a l'Energie Atomique, Fontenay-AuxRoses (France). Centre d'Etudes Nucleaires.
METHODES PHYSIQUES D'ANALYSE DE L'HEXAFLUORURE D'URANIUM (PHYSICAL ANALYTICAL METHODS FOR URANIUM HEXAFLUORIDE).
Thesis in French,
by Gerard Vandenbussche. Dec 65, 35p CEA-R-2863
Text in French; Attached Summary in English.

Descriptors: (*Uranium compounds, Fluorides), (*Fluorides, Chemical analysis), Ultrasonic radiation, Vapor pressure, Ultraviolet spectro scopy, Infrared spectroscopy, Distillation, Subli mation, Nuclear magnetic resonance, Mass spectroscopy, Reviews, France.

Identifiers: Uranium hexafluoride.

Various analytical methods currently used or still under investigation, such as sonic analysis, vapor pressure measurements, fractional distillation, cryometry, microsublimation, ultra-violet, visible and infra-red absorption spectrophotometry, nuclear magnetic resonance and mass spectrometry, are reviewed. For each method, principle and applications are given, and results obtained concerning reproductibility, application limits and rapidity are discussed. (Author)

PB-169 233 **Field 7D, 18J**
CFSTI Prices: HC$3.00 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
DIFFUSION, MOBILITE ELECTRIQUE ET INTER- ACTIONS IONIQUES DANS LES SELS FONDUS (Diffusion Electrical Mobility and Ionic Interactions in Molten Salts.)
Doctoral thesis in French,
by Frederic Lantelme. 6 May 65, 69p CEA-R-2806
Text in French; Attached summary in English.

Descriptors: (*Salts, Ionic current), (*Nitrates, Ionic current), (*Ions, Diffusion), Lithium compounds, Sodium compounds, Potassium compounds, Tracer studies, Electrical properties, Electrostatics, Polarization, Theory, France.

Identifiers: Fused salts, Lithium nitrate, Potassium nitrate, Sodium nitrate.

The diffusion and the electrical migration of ions in the molten alkali nitrates LiNO3 NaNO3 and KNO3 and in their mixtures were examined using stable or radio-active isotope indicators. This work shows that there are large differences in the diffusion coefficients and the electric mobilities when they are compared using the Nernst-Einstien formula. An interpretive model is put forward which shows the role played by poly-ionic displacements; in a salt AC the particles moving are not only the free ions A (-) and C (+) but also the groups / AnCn'/ (n'-n +). These results confirm the importance of electrostatic attraction and of the polarizability of the ions. This mechanims, furthermore, explains the inversions of electrical mobilities often observed in liquid ionic media. (Author)

PB-169 355 **Field 7B**
CFSTI Prices: HC$6.60 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
ETUDE DE QUELQUES PROPRIETES DU PHOSPHATE DE ZIRCONIUM. (Study of Some Properties of Zirconium Phosphate).
Doctoral thesis in French,
by Jacques Prospert. 1966, 64p CEA-R-2835
Text in French; Attached Summary in English.

Descriptors: (*Zirconium compounds, Phosphates), (*Ion exchange, Materials), Ions, Chemical properties, Physical properties.
Identifiers: Zirconium phosphate.

Zirconium phosphate has been studied with a view to using it as an ion-exchanger: the first objective was to develop a method of preparation easy to apply and also reproducible. To this end, several tests were carried out varying the molar ratios of phosphorus and of zirconium. Some physical properties such as the diffraction of X-rays were examined. The work then involved certain chemical properties, particularly the percentages of free water and structural water given by the loss on calcination, the Karl-Fisher method and the weight losses by thermogravimetry. Finally an attempt was made to apply the exchanger to the separation of alcaline ions. The static tests showed that the order of fixation of these ions was Cs (+) > Rb (+) > > K (+) > Nd (+). Tests with columns showed that Na (+) and K (+) were easily separable, as was the Rb (+)-Cs (+) mixture, this last pair being fairly difficult to dissociate. (Author)

TID-21383 **Field 7E, 18G**
CFSTI Prices: HC$6.00 MF$1.50
Pennsylvania State Univ., University Park. Dept. of Chemical Engineering.
FISSION FRAGMENT AND NUCLEAR REACTOR IRRADIATION OF METHANE AND METHANE -HYDROCARBON MIXTURES.
Doctoral thesis,
by Carl Wiern Farley. Sep 64, 299p Che-12-64
Contract AT (30-1)-2915

Descriptors: (*Methane, Radiation chemistry), (*Fission products, Radioactivity).

TID-4005 (2nd ed.) **Field 7B, 7C, 7D, 7E**
CFSTI Prices: HC$1.75 MF$1.00
Division of Research (AEC), Washington, D. C.
SUMMARIES OF THE USAEC BASIC RESEARCH PROGRAM IN CHEMISTRY (OFF-SITE).
Jan 66, 158p

Descriptors: (*Chemistry, Scientific research).

WAPD-TM-311 **Field 7C, 7D, 7A**
CFSTI Prices: HC$1.00 MF$0.50
Bettis Atomic Power Lab., Pittsburgh, Pa.
SOLUBILITY OF CARBON DIOXIDE IN THE AMMONIUM CITRATE SOLUTION OF THE APAC PROCESS,
by R. Lloyd. Nov 65, 10p
Contract AT-11-1-GEN-14

Descriptors: (*Carbon dioxide, Solubility), (*Ammonium compounds, Citrates).

Identifiers: APAC process.

8. EARTH SCIENCES AND OCEANOGRAPHY

AD-406 895 **Field 8K, 9B**
CFSTI Price: HC$16.80
Texas Instruments, Inc., Dallas. Science Services Div.
DIGITAL SEISMOGRAPH SYSTEM.
Final rept.,
by Bruce M. Williams. 29 Mar 63, 172p
Contract AF 19 (628)-472, ARPA Order-180-61, Proj. AF-8652,
Task 865205
AFCRL 63-433

Descriptors: (*Seismographs, Digital recording systems), (*Digital recording systems, Seismographs), Geology, Computers, Design.

Identifiers: Vela-Uniform project.

This report describes the research, design, and development of a prototype three-component Digital Seismograph System having an output compatible with modern high-speed computers. It also describes the assembly and evaluation of a working model. The development included selection of an optimum system for digitizing the motion of seismometer masses. It was the intention of this program to develop a system of greater dynamic range (120 db), a broad frequency band (0.1 to 10 cps), good linearity, and other characteristics within the tolerance limits of comparable conventional instruments. (Author)

AD-431 021 **Field 8K**
CFSTI Price: HC$13.60
Geotechnical Corp., Garland, Tex.
DEEP-HOLE SEISMOMETER.
Semiannual technical rept. no. 5.
15 Dec 63, 132p TR-63-99
Contract AF 33 (600)-43369, ARPA Order-104, Proj. VT/1139

Descriptors: (*Seismometers, Underground), Seismology, Seismological stations, Underground structures, Data processing systems.

Surface noise was measured at 25 locations and used as an aid in the selection of deep-well sites. Four deep-well sites were found with amplitudes sufficiently low to make them worth further consideration. Field measurements were made at deep-well sites near Orlando, Florida, on Eniwetok Atoll, and near Apache, Oklahoma. A deep-well site at the Uinta Basin Seismological Observatory, Vernal, Utah, was located and prepared for use. Data recorded at the deep-well sites were visually analyzed and spectral analyses were made of the magnetic-tape recordings. Theoretical work was done at the Data Analysis and Technique Development Center (DATAC) using measured and assumed velocities of the layers of earth at the well sites. Comparison of the theoretical results with those of the measurement program suggests the need to consider layers much deeper in the earth than previously believed necessary. A processing system was developed to permit summation, filtering, or delaying of signals recorded from two seismometers. Signals recorded from two seismometers in the well at the Grapevine test site were processed with the system.

AD-462 616 **Field 8E, 22B**
CFSTI Price: $3.60
Johns Hopkins Univ., Silver Spring, Md. Applied physics Lab.
RECENT PROGRESS IN SATELLITE GEODESY.
Technical memo.,
by W. H. Guier. Feb 65, 33p TG-659
Contract NOw-62-0604-c
Presented at the National Winter Convention on Military Electronics, IEEE, 3-5 Feb 1965.

Descriptors: (*Geodesics, Satellites (Artificial)), (Satellites (Artificial), Geodesics), Astronomical geodesics, State-of-the-art reviews.

Satellites continue to be prolific sources of geodetic information. This paper presents a brief review of the types of satellite data that have been extensively used for geodetic determinations and basic approaches to inferring geodetic parameters from the data. In particular, the author's use of range rate (radio doppler) to determine values for the non-zonal coefficients of the geopotential is outlined and the latest values through eighth order and degree are given. The most recent activity in the use of satellite data is to determine coefficients of the geopotential for degree and order of 13 and 14 through the effects of near resonance between the satellite motion and these components of the geopotential. Preliminary values are given for degree and order 13. (Author)

PB-169 001 **Field 8B, 9B**
CFSTI Prices: HC$2.00 MF$0.50
Coast and Geodetic Survey, Washington, D. C.
AEROTRIANGULATION STRIP ADJUSTMENT USING FORTRAN AND THE IBM-1620 COMPUTER,
by C. T. Horsfall. Mar 65, 26p
See also PB-169 330, PB-169 331.

Descriptors: (*Photogrammetry, Programming (Computers)), Mapping, Aerial photography, Stereoscopic map plotters, Least squares method, Analog systems.

Identifiers: FORTRAN, Triangulation, IBM 1620.

This paper is a purely mathematical treatment of the problem of adjusting strips of the provisional machine coordinates obtained from either the analogue or the analytical method relating them to a homogeneous ground coordinate system. (The analogue method uses such instruments as the Wild A-7, A-5; Zeiss C-5, C-8, and Santoni Stereo-carto IV; the analytical method is obtained from mono or stereo-comparators ('Analytic aerotriangulation,') by W. D. Harris, et al. C and GS Technical Bulletin no. 21, corrected July 1963.) Both the horizontal and vertical machine coordinates are adjusted simultaneously through nonlinear polynomials. Because of the need for determining simultaneously a large number of unknowns, the adjustment is carried out by the method of least squares. The aerial triangulation is performed as a system of independent strips.

PB-169 330 **Field 8B, 9B**
CFSTI Prices: HC$6.60 MF$0.75
Coast and Geodetic Survey, Wash., D. C.
SUPPLEMENT TO ELECTRONIC COMPUTER PROGRAMS FOR ANALYTICAL AERIAL TRIANGULATION AND AEROTRIANGULATION STRIP ADJUSTMENT USING FORTRAN AND THE IBM 1620 COMPUTER,
by Melvin J. Umbach. Feb 66, 67p

Descriptors: (*Photogrammetry, Programming (Computers)), Mapping, Stereoscopic map plotters, Aerial photography.

Identifiers: FORTRAN, Triangulation, IBM 1620.

The following discussion and sample set of operational data were prepared as a supplement to the analytic aerotriangulation program series in the Horsfall Bulletins (PB-169 001, and PB-169 331) in response to a number of inquiries received from the photogrammetric community. After several minor revisions were made to the original programs, the entire series was tested with a set of actual data. The Appendices contain the sample input and output of each program and serve to demonstrate the continuous flow of data throughout the series.

PB-169 331 **Field 8B, 9B**
CFSTI Prices: HC$6.60 MF$0.75
Coast and Geodetic Survey, Wash., D. C.
ELECTRONIC COMPUTER PROGRAMS FOR ANALYTICAL AERIAL TRIANGULATION,
by C. T. Horsfall. Jun 65, 68p
See also PB-169 001, PB-169 330.

Descriptors: (*Photogrammetry, Programming (Computers)), Mapping, Stereoscopic map plotters, Equations, Iterative methods, Aerial photography.

Identifiers: FORTRAN, IBM 1620, Triangulation.

This paper consists of two chapters. The first chapter deals with the relative orientation problem, while the second concerns the strip formation of the relatively oriented stereo models -- the cantilever assembly. The relative orientation is done independently model by model, and the model coordinates are computed and checked. The strip is then formed, and in the process, the coordinates are expressed in a single cartesian coordinate system. Two separate computer programs are included which have been written in Fortran language and tested on the United States Coast and Geodetic Survey IBM-1620 computer with 100K digits storage locations.

PB-169 336 **Field 8K, 13B**
CFSTI Prices: HC$2.60 MF$0.50
Coast and Geodetic Survey, Rockville, Md.
SEISMIC NOISE SURVEY, PATRICK AIR FORCE BASE, FLORIDA.
Rept. no. 2,
by T. R. Shugart and W. V. Mickey. Feb 65, 21p

Descriptors: (*Seismology, Florida), (*Site selection, Test facilities), (*Test facilities, Florida), Microseisms, Tolerances (Mechanics), Buildings, Instrumentation.

A survey was conducted under contract AF 08 (606)5300 to determine the seismic noise level at the first proposed site of laboratory test building FY-65 MCP. The tolerance requirement for the site was 0.00001 g from 1 to 5 cps and 0.0001g from 5 to 200 cps.

PB-169 337 **Field 8K, 17J, 18C**
CFSTI Prices: HC$3.60 MF$0.50
Coast and Geodetic Survey, Wash., D. C.
SEISMIC WAVE PROPAGATION,
by W. V. Mickey. Apr 64, 34p

Descriptors: (*Seismic waves, Propagation), (*Seismology, Nuclear explosions), (*Nuclear explosions, Seismology), Biophysics, Vibration, Perception, Explosion effects, Underground explosions.

The Coast and Geodetic Survey has recorded and analyzed over 6,000 seismic data channels from seismograph recordings at distance ranges of less than 0.5 to over 350 km, in conjunction with the current nuclear detonation program starting in September 1961. Prediction functions for transitory earth motion in terms of displacement, velocity and acceleration have been developed for yield ranges of less than 0.5 to 200 kt. Vibration perceptibility thresholds from biophysical sources are reviewed with particular application to seismology. Calculations of percentage of total source energy conversion to seismic energy is evaluated over the yield range of 0.43 to 200 kt for several different media. The relative seismic energy for contained and cratering nuclear detonations are presented. Seismic propagation characteristics for several events are studied. (Author)

PB-169 338 **Field 8K, 17J**
CFSTI Prices: HC$13.60 MF$1.00
Coast and Geodetic Survey, Washington, D. C.
SEISMIC DATA SUMMARY NUCLEAR DETONATION PROGRAM 1961 THROUGH 1963,
by W. V. Mickey and T. R. Shugart. Jan 64, 132p

Descriptors: (*Seismology, Nuclear explosions), (*Nuclear explosions, Seismology), Mobile, Seismological stations, Instrumentation, Tables, Data, Underground explosions.

PB-169 339 **Field 8K, 14B**
CFSTI Prices: HC$3.60 MF$0.50
Coast and Geodetic Survey, Washington, D. C.
SEISMIC NOISE SURVEY, NASA GODDARD SPACE FLIGHT CENTER,
by W. V. Mickey and T. R. Shugart. Nov 64, 39p

Descriptors: (*Seismology, Maryland), Site selection, Test facilities, Microseisms.

PB-169 340 **Field 8K, 14B, 20H**
CFSTI Prices: HC$3.60 MF$0.50
Coast and Geodetic Survey, Washington, D. C.
SEISMIC DISTURBANCES GENERATED BY TITAN III 624A SOLID MOTOR SLED TEST,
by W. V. Mickey and T. R. Shugart. Oct 64, 34p

Descriptors: (*Rocket motors (Solid propellant), Impact tests), (*Seismology, Impact tests), Rocket-propelled sleds, Impact shock, Concrete, Soils, Seismic waves, Ranges (Establishments), Rocket research.

Identifiers: Titan 3.

PB-169 341 **Field 8K, 18C**
CFSTI Prices: HC$6.60 MF$0.75
Coast and Geodetic Survey, Rockville, Md.
SEISMIC EFFECTS FROM A NUCLEAR CRATERING EXPERIMENT IN BASALT,
by L. M. Lowrie and W. V. Mickey. Nov 64, 62p
WT 1813

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Cratering, Nuclear explosions), Basalt, Explosion effects.

Identifiers: Dannyboy project.

PB-169 414 **Field 8A**
CFSTI Prices: HC$6.00 MF$1.25
Pacific Oceanographic Group, Nanaimo (British Columbia).
BIOMASS ATLAS OF NET ZOOPLANKTON IN THE NORTHEASTERN PACIFIC OCEAN, 1956-1964,
by R. J. LeBrasseur. Dec 65, 263p
FRBC Manuscript (O/L)-201

Descriptors: (*Pacific Ocean, Plankton), (*Plankton, Pacific Ocean), Marine biology, Oceanographic data, Maps.

The collection of zooplankton samples in the northeast Pacific Ocean was carried out as during oceanographic and exploratory fishing surveys. Samples were collected from vertical hauls and horizontal tows with a NORPAC net; other samples were collected with an Isaac-Kidd madwater trawl. In this report, the survey data for all vertical hauls from 1956 to 1964 have been brought together in Atlas form. The immediate objective of this study has been to accumulate data on the extent of the standing crop of net zooplankton and further to examine changes in the standing crop of zooplankton in relation to accompanying oceanographic and fishing observations. The first part of the objective is met by this Atlas, which presents all data collected from standard net hauls in a common format. (Author)

PB-169 432 **Field 8M, 13B**
CFSTI Prices: HC$4.00 MF$0.75
Louisiana State Univ., Baton Rouge. Div. of Engineering Research.
THE EFFECT OF DELAYED COMPACTION ON STABILIZED SOIL-CEMENT,
by Ara Arman and Fayez Said Saifan. 1965, 110p Engineering-Research-bull-88
Proj. 736-00-28
Prepared in cooperation with Bureau of Public Roads.

Descriptors: (*Civil engineering, Soil mechanics), (*Soil mechanics, Cements), (*Cements, Soil mechanics), Soils, Stabilization, Compacting, Compressive properties.

This study attempts to establish the working range of some of the physical variables produced by delayed compaction after mixing soil-cement stabilized material. The effects of the delayed compaction and fluctuations in the optimum cement content, and optimum moisture content of the mix on the density, unconfined compression strength,

and durability of the final product are investigated. Compaction was delayed for periods from zero to six hours after mixing to determine its effect on compressive strength, durability, and the density of the final product. The results of the study show that the intensity of the effect of the delayed compaction depends to a large extent on the type of soil. Most of the silty and clayey soils undergo serious losses of strength, durability, and density. Results indicate that the reduced density is one of the causes of loss in strength. A study of the initial and final setting times of the portland cement used in this study indicated that serious losses of strength density and durability occured at a time coinciding with the initial setting time of cement paste. (Author)

RME-4552 (Rev) **Field 8G**
CFSTI Prices: HC$1.00 MF$0.50
Division of Raw Materials (AEC), Washington, D. C.
RECONNAISSANCE FOR URANIUM IN THE LONQUIMAY AREA, PROVINCE OF MALLECO, CHILE,
by Paul H. Knowles, William A. Bowes, Mario C. Serrano, and Moraga B. Aldo. Oct 62, 13p
Prepared in cooperation with Istituto de Investigaciones Geologicas, Santiago (Chile).

Descriptors: Natural resources, Uranium), (*Uranium, Chile).

9. ELECTRONICS AND ELECTRICAL ENGINEERING

AD-443 686 **Field 9A**
CFSTI Prices: HC$14.60
Texas Instruments, Inc., Dallas. Semiconductor-Components Div.
TRANSISTORS, TRIODE, SILICON, PNP SWITCHING.
Final rept., 1 Apr 63-30 May 64,
30 Jul 64, 148p Rept. no. TI-03-64-30
Contract DA-36-039-AMC-00145 (E)

Descriptors: (*Transistors, Switching circuits), Triodes, Silicon.

AD-451 748 **Field 9A, 13H**
CFSTI Price: $3.00
Hamilton Standard Div., United Aircraft Corp., Broad Brook, Conn.
MODULAR INTERCONNECTIONS FOR HERMETIC MICRO-ASSEMBLIES.
Rept. no. 4 (final), 20 Feb-20 Nov 62, 10 May 6327 Apr 64,
by D. J. Garibotti and J. E. Taylor. 27 Apr 64, 88p
Contract DA-36-039-sc-89176,
Proj. DA 3A99-15-002,
Task 3A99-15-002-03

Descriptors: (*Microminiturization (Electronics), Circuits), (*Circuits, Hermetic seals), Electron beams, Welding, Copper.

The three major objectives pursued during the course of this program were: Task A, development of an hermetic all-electron beam welded interconnection packaging system--microassembly; Task B, development of electron beam processes for the hermetic sealing of standard Micro-Module Stacks; and Task C, development of electron beam processes for welding of copper ribbons to discrete terminations metallized and copper plated about the edges and surface periphery of microwafers. This report is devoted prevalently to the results of Task C.

AD-455 124 **Field 9A**
CFSTI Prices: HC$7.60
Radio Corp. of America, Harrison, N. J. Microwave Tube Operations Dept.
RESEARCH STUDIES OF QUANTUM DETECTORS AND MIXERS.
Final rept., 1 Jul 62-30 Aug 64,
by D. Blattner and J. Ruedy. 30 Aug 64, 75p
Contract DA-36-039-sc-90846,
Task DA-1G6-22001-A-055-02
N65 20444

Descriptors: (*Phototubes, Army research), Photomultipliers, Photocathodes, Secondary emission, Microwave frequency, Detectors, K band, Broadband, Bandwidth, Diodes (Semiconductor), Quantum mechanics, Sensitivity, Potassium compounds, Chlorides, Magnesium compounds, Oxides.

Photomultiplier tubes capable of extending the low-noise gain of secondary emission multiplication to microwave frequencies were designed and operated. The tubes consisted of a semitransparent photocathode sensitive to the required spectral region, a multi-stage structure of transmission secondary emission dynodes, and a helical output coupler through which the electrons from the last dynode are focused. Experimental results are reported for tubes having a center frequency of 1.5 Gc and a bandwidth of 1.0 Gc. Tests indicate that any deterioration of modulation by the secondary emission multiplication process is small compared to the gain achieved in the dynodes. The noise is that predicted from the statistics of photo- and secondary-emission. For light wavelengths where efficient photocathodes can be constructed, the sensitivity of this tube approaches that of an ideal detector. Calculations indicate that scaling of this tube design to frequencies as high as K sub a band is possible. (Author)

AD-456 965 **Field 9A**
CFSTI Prices: HC$17.60
Eitel-McCullough, Inc., San Carlos, Calif.
RESEARCH ON MICROWAVE WINDOW MULTIPACTOR AND ITS INHIBITION.
Final rept., 1 Jul 62-30 Jun 64,
by Raymond Hayes. 30 Jun 64, 180p
Contract DA-36-039-sc-90818, ARPA Order-318-62,
Task DA-1G6-22001-A-055-04

Descriptors: (*Waveguide windows, Electric arcs), Secondary emission, Metal films, Coatings, Titanium, Configuration, Electron tubes, Microwave equipment, Electron bombardment, S band, Aluminum compounds, Oxides, Argon, Monoxides, Titanium compounds, Beryllium compounds.

The problem of multipactor at microwave windows is discussed and the results of theoretical and experimental studies on multipactor at a single dielectric surface are presented, with information on the power levels at which such discharges may be expected to occur. Methods of eliminating multipactor at windows are described and include surface coatings, applied by evaporating titanium in vacuum or sputtering titanium monoxide in argon or mercury, and grooves cut in the window surface perpendicular to the electric field. Factors affecting the nature of the surface coatings during application and in subsequent tube processing are described. A wide variety of coatings has been evaluated at S-band on alumina, beryllia, and quartz windows at power levels up to 100 Mw peak equivalent transmitted power and average dissipations equivalent to over 300kw of average power. The maximum peak power supported by multipactor resistant windows was limited by arcing at the metal-dielectric seal. Various methods of increasing the threshold power for arcing have been tried. The most successful arrangement employed a window ceramic of 'H' shaped cross section in which the metal-dielectric seal was located in a region of weak electric intensity. (Author)

AD-461 486 **Field 9A**
CFSTI Price: HC$4.60
IBM Space Guidance Center, Owego, N. Y.
STUDY OF EFFECT OF HIGH-INTENSITY PULSED NUCLEAR RADIATION ON ELECTRONICS PARTS AND MATERIALS (SCORRE).
Semiannual progress rept. no. 1, 15 Jun-31 Dec 64.
31 Dec 64, 44p IBM-65-521-05
Contract DA-28-043-AMC-00212 (E)

Descriptors: (*Electronic equipment, Radiation damage), (*Radiation damage, Electronic equip ment), Magnetic core storage, Magnetic tape, Ceramic capacitors, Glass capacitors, Mica capacitors, Tantalum capacitors, Capacitors, Styrene plastics, Halocarbon plastics, Resistors, Films, Cermets, Secondary emission, Electron beams, Gamma rays, Neutrons, Nuclear reactors, Measurement.

Identifiers: SCORRE.

Radiation testing of ceramic, glass, tantalum, mica, polystyrene, and mylar capacitors is complete. Data analysis is not complete. New effects were observed when testing glass and tantalum capacitors. Leakage currents in irradiated thin film resistors are principally due to secondary emission and air ionization. No data errors were detected on a magnetic tape that was irradiated. Dosimetry techniques are described, and errors in previous linac dosimetry are discussed. (Author)

N66-12155 **Field 9B**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
ERROR ANALYSIS OF BINARY RATE MULTIPLIER.
Technical note,
by George J. Moshos. Dec 65, 32p NASA-TN-D-3124

Descriptors: (*Special purpose computers, Digital computers), (*Errors, Special purpose computers).

N66-12255 **Field 9E, 14D**
CFSTI Prices: HC$2.00 MF$0.50
General Electric Co., Daytona Beach, Fla.
SINGLE PARAMETER TESTING APPLICATION.
Contractor rept.,
by E. L. Berger and J. C. Jackson. Dec 65, 29p
Contract NAS8-11715, pt 3
NASA CR-339

Descriptors: (*Servomechanisms, Systems engineering), (*Test methods, Control systems).

N66-12963 **Field 9B**
CFSTI Prices: HC$3.00 MF$0.75
Maryland Univ., College Park. Computer Science Center,
PATTERN RECOGNITION. I. A COMPUTER PROGRAM FOR GENERATING SYNTHETIC PATTERNS,
by N. S. Anderson, A. Rosenfeld, and N. F. Simenson. Jun 64, 74p TR-64-8
Grant NsG-398
NASA CR-68300

Descriptors: (*Pattern recognition, Computers), (*Programming languages, Pattern recognition).

Identifiers: FORTRAN, Alphanaumeric.

N66-13154 **Field 9F**
CFSTI Prices: HC$1.00 MF$0.50
Planning Research Corp., Los Angeles, Calif.
GEODETIC SATELLITE TELEMETRY SUBSYSTEM RELIABILITY ASSESSMENT,
by C. E. Bloomquist and W. C. Graham. 8 Oct 65, 21p PRC-D-1116, Technical advisement memo-106-11
Contract NASw-1180
NASA CR-68465

Descriptors: (*Scientific satellites, Geodesics), (*Geodesics, Telemeter systems), (*Telemeter systems, Performance (Engineering), Reliability.

Identifiers: Geodetic satellites.

N66-13166 **Field 9D, 12A**
CFSTI Prices: HC$3.00 MF$0.75
Inst. of Tech., Cambridge. Research Lab. of Electronics. Mass.
THE COMPUTATION PROBLEM WITH SEQUENTIAL CODING.
Technical rept.,
by J. E. Savage. 16 Feb 65, 78p TR-439
Grants NsG-334, NsG-496
NASA CR-68542
Prepared in cooperation with Air Force and Dept. of the Army, Contracts AF 19 (628)-500, DA-36-039-AMC-03200 (E).

Descriptors: (*Coding, Data transmission systems), (*Decoding, Data transmission systems), Sequences, Probability, Distribution, Time.

N66-13558 **Field 9C, 12A**
CFSTI Prices: HC$1.00 MF$0.50
Tennessee Univ., Knoxville. Dept. of Electrical Engineering.
GEOMETRICAL INTERPRETATION AND GRAPHICAL SOLUTION TO MINIMUM ENERGY DISCRETE-DATA CONTROL.
Scientific rept. no. 9,
by J. C. Hung and A. M. Revington. 15 Jun 65, 20p
Grant NsG-351
NASA CR-68498

Descriptors: (*Pulse modulation, Amplitude modula tion), (*Modulators, Design), Graphics, Geometry, Control.

N66-13559 **Field 9D, 17B, 22B**
CFSTI Prices: HC$3.00 MF$0.50
Stanford Univ., Calif. Radioscience Lab.
CODING SCHEMES FOR ADDITIVE NOISE CHANNELS WITH FEEDBACK.
Scientific rept. no. 10,
by J. P. M. Schalkwijk. Aug 65, 58p SEL-65-073
Grant NsG-377
NASA CR-68651

Descriptors: (*Coding, Space communication systems), (*Satellites (Artificial), Space communication systems), Bandwidth, Noise (Radio), Broadband, Narrowband.

N66-13832 **Field 9F**
CFSTI Prices: HC$2.00 MF$0.50
Microwave Electronics Corp., Palo Alto, Calif.
INVESTIGATION OF SOLID STATE TRAVELING -WAVE-AMPLIFIER TECHNIQUES FOR FUTURE SATELLITE APPLICATIONS.
Quarterly progress rept. no. 4, 1 Mar - 30 Jun 65,
by V. R. Johnson and F. A. Olson. Jul 65, 40p
Contract NAS5-3972
NASA CR-68843

Descriptors: (*Amplifiers, Traveling wave tubes).

N66-13839 **Field 9F**
CFSTI Prices: HC$2.00 MF$0.50
Texas Univ., Austin.
RADIO ASTRONOMY SIGNAL SPECTRUM ANALYSER.
Master's thesis,
by J. H. Sizelan. Sep 65, 33p
Grant NsG-432
NASA CR-68780

Descriptors: (*Radio astronomy, Spectrum analyzers).

N66-13841 **Field 9F**
CFSTI Prices: HC$2.00 MF$0.50
Pennsylvania State Univ., University Park. Dept. of Electrical Engineering.
AN INVESTIGATION OF SECOND-ORDER CORRECTIONS TO FIRST-ORDER RAY THEORY AS APPLIED TO BEACON SATELLITE TRANSMISSION STUDIES,
by N. D. Foltz. 15 Nov 65, 40p Scientific-SR-225
Grant NsG-114-61
NASA CR-68764

Descriptors: (*Ionosphere, Wave transmission).

N66-14053 **Field 9E, 20F**
CFSTI Prices: HC$3.00 MF$0.75
Ohio State Univ., Columbus.
APPLICATION OF WEDGE DIFFRACTION TO ANTENNA THEORY,
by R. C. Rudduck. Jan 66, 65p
Grant NsG-448
NASA CR-372

Descriptors: (*Antennas, Optical analysis), (*Optical analysis, Antennas), Diffraction, Theory.

NYO-1480-16 **Field 9B**
CFSTI Prices: HC$1.00 MF$0.50
AEC Computing and Applied Mathematics Center, New York Univ., N. Y.
ON COMPUTING AND APPLIED MATHEMATICS FOR THE HALF YEAR, JULY 1 - DECEMBER 31, 1964. TECHNICAL SUMMARY FOR TASKS I AND V.
Progress rept. no. 33,
by Robert T. Shevlin. 29 Mar 65, 25p
Contract AT (30-1)-1480

Descriptors: (*Magnetic core storage, Computers), (*Computers, Scientific research).

ORNL-3826 **Field 9B, 10B**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
ISOPOWER - COMPUTER PROGRAM FOR CALCULATING POWER OUTPUT OF SINGLE RADIOISOTOPE OR MIXED RADIONUCLIDE POWER SOURCES,
by Charles W. Friend and J. R. Knight. Dec 65, 27p
Contract W-7405-eng-26

Descriptors: (*Radioactive isotopes, Energy con version), (*Programming languages, Radioactive isotopes).

Identifiers: Isopower.

ORNL-3846 **Field 9B, 12A**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
NUMERICAL SOLUTION OF THE LAGRANGE MULTIPLIER PROBLEM WITH SEVERAL CONSTRAINTS,
by Francis B. K. Kam and Francis H. S. Clark. Dec 65, 34p
Contract W-7405-eng-26

Descriptors: (*Numerical analysis, Partial differential equations), (*Programming (Computers), Numerical analysis), Programming languages.

PB-169 367 **Field 9A**
CFSTI Prices: HC$1.60 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
PREAMPLIFIER TYPE M.
Technical manual instrument calibration procedure, AA-30.
1 Dec 65, 17p NAVWEPS-17-20AA-30

Descriptors: (*Preamplifiers, Calibration), (*Amplifiers, Oscilloscopes), (*Oscilloscopes, Preamplifiers).

The Test Instrument is a plug-in preamplifier used with Tektronix oscilloscopes. It contains four identical channels that can be used separately or electronically switched to produce single- or multitrace displays. Each channel provides calibrated step attenuation, a vertical positioning control, and either d-c or a-c coupling.

TID-21930 **Field 9C, 9A**
CFSTI Prices: HC$3.00 MF$0.75
Tennessee Univ., Knoxville. Dept. of Electrical Engineering.
FAST HYBRID BISTABLE MULTIVIBRATORS.
Scientific rept. no. 14,
by J. K. Millard and J. F. Pierce. 15 Oct 64, 70p
Contract W-7405-eng-26

Descriptors: (*Relaxation oscillators, Scalers), (*Scalers, Relaxation oscillators).

10. ENERGY CONVERSION (NON-PROPULSIVE)

AD-462 470 **Field 10A**
CFSTI Price: HC$8.60
Engelhard Industries, Inc., Newark, N. J. Process Equipment Div.
HYDROGEN GENERATION FOR FUEL CELLS.
Rept. no. 8 (final) 1 May 62-30 Sep 64.
30 Sep 64, 85p
Contract DA-36-039-SC-89077,
Task 1G6-22001-A-052-04

Descriptors: (*Fuel cells, Hydrogen), (*Hydrogen, Production), Sources, Ammonic, Alcohols, Hydro carbons, Processing, Design, Separation, Diffusion, Palladium alloys, Jet engine fuels, Tables, Mechani cal drawings, Portable.

N66-12991 **Field 10A**
CFSTI Prices: HC$2.00 MF$0.50
Hughes Research Labs., Malibu, Calif.
THEORY AND PERFORMANCE OF AUXILIARY DISCHARGE THERMIONIC ENERGY CONVERTERS,
by M. Fox and R. C. Knechtli. Jun 62, 39p
Rept. no. 243
Contract NAS3-1909
NASA CR-68366

Descriptors: (*Thermionic converters, Performance (Engineering)), Gas discharges, Plasma physics, Thermodynamics.

N66-12998 **Field 10C**
CFSTI Prices: HC$3.00 MF$0.75
Battelle Memorial Inst., Columbus, Ohio. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THERMAL-ENERGY-STORAGE SUPPORTING RESEARCH.
Interim technical rept., 1 Apr-30 Sep 65,
by D. P. Moak. 31 Oct 65, 62p
Contract NAS7-100
NASA CR-68369
Prepared in cooperation with Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena, rept. no. JPL-950 978.

Descriptors: (*Energy, Storage), Aluminum, Berylium, Magnesium, Heat, Tungsten.

Identifiers: Thermal energy storage.

N66-13080 **Field 10A**
CFSTI Prices: HC$1.00 MF$0.50
Radio Corp. of America, Mountaintop, Pa. Electronic Components and Devices.
RESEARCH AND DEVELOPMENT STUDY ON IMPROVEMENT OF ADVANCED RADIATION RESISTANT MODULARIZATION TECHNIQUES.
Final rept., 15 May-30 Nov 64.
18 Dec 64, 18p
Contract NAS5-3812
NASA CR-68545

Descriptors: (*Solar cells, Radiation damage), (*Dielectric films, Printed circuits).

N66-13128 **Field 10A**
CFSTI Prices: HC$2.00 MF$0.50
Electro-Optical Systems, Inc., Pasadena, Calif.
HYDROGEN-OXYGEN ELECTROLYTIC REGENERATIVE FUEL CELLS.
Quarterly rept., 1 Jul-1 Oct 65,
by E. Findl and M. Klein. 17 Dec 65, 39p EDS-4110-QL-5
Contract NAS3-2781
NASA CR-54805

Descriptors: (*Fuel cells, Electrolytes), (*Oxygen, Fuel cells), (*Hydrogen, Fuel cells).

N66-13561 **Field 10C, 7D**
CFSTI Prices: HC$3.00 MF$0.50
Gulton Industries, Inc., Metuchen, N. J. Alkaline Battery Div.
INVESTIGATION OF BATTERY ACTIVE NICKEL OXIDES.
Quarterly rept. no. 1,
by P. Ritterman and H. N. Seiger. 12 Sep 65, 54p
Contract NAS3-7620
NASA CR-54832

Descriptors: (*Electrodes, Alkaline cells), (*X-ray diffraction analysis, Electrodes), Nickel, Cadmium, Oxides, Nickel compounds.

N66-13568 **Field 10C, 7D**
CFSTI Prices: HC$1.00 MF$0.50
Leesona Noos Labs., Div. Leesona Corp., Great Neck, N. Y.
THE IMPROVEMENT OF ZINC ELECTRODES FOR ELECTROCHEMICAL CELLS.
Quarterly rept. no. 1, 3 Jun - 3 Sep 65,
by C. W. Fleischmann and J. E. Oxley. 1965, 21p
Contract NAS5-9591
NASA CR-68646

Descriptors: (*Electrodes, Electrolytic cells), (*Zinc, Electrodes), Silver compounds, Oxides.

N66-13637 **Field 10C**
CFSTI Prices: HC$3.00 MF$0.75
Eagle-Picher Co., Joplin, Mo. Couples Dept.
INVESTIGATIONS LEADING TO THE DEVELOPMENT OF A PRIMARY ZINC-SILVER OXIDE BATTERY OF IMPROVED PERFORMANCE CHARACTERISTICS.
Final rept. 1 Jul 64-30 Jun 65,
by B. R. Hawkins. 1965, 81p
Contract NAS8-5493
NASA CR-68563

Descriptors: (*Primary batteries, Design).

N66-13641 **Field 10A**
CFSTI Prices: HC$3.00 MF$0.75
Hughes Aircraft Co., El Segundo, Calif. Space Systems Div.
DESIGN AND EVALUATION STUDY OF DEPLOYABLE SOLAR ARRAY FOR SPINNING SATELLITES.
Final rept.
Oct 64, 96p SSD-4473R
Contract NAS5-3989
NASA CR-68479

Descriptors: (*Solar cells, Design).

N66-13645 **Field 10A**
CFSTI Prices: HC$1.00 MF$0.50
Yardney Electric Corp., New York.
RESEARCH AND DEVELOPMENT OF THE SILVER OXIDE-CADMIUM ELECTROCHEMICAL SYSTEM.
Quarterly progress rept. no. 3, 10 May-9 Aug,
by A. Charkey. 1965, 24p
Contract NAS5-9106
NASA CR-68796

Descriptors: (*Primary cells, Temperature).

N66-13646 **Field 10A**
CFSTI Prices: HC$3.00 MF$0.75
Thermo Electron Engineering Corp., Waltham, Mass.
APPLIED THERMIONIC RESEARCH.
Quarterly progress rept no. 1, 25 Jun-25 Sep 65,
by S. Kitrilakis, D. Lieb, F. Rufeh, and L. Van Someren. 1965, 67p TE-23-66
Contract NAS7-100
NASA CR-68799
Prepared in cooperation with Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena, rept. no. JPL-951 262.

Descriptors: (*Thermionic converters, Design).

N66-13649 **Field 10A**
CFSTI Prices: HC$2.00 MF$0.50
Radio Corp. of America, Harrison, N. J. Direct Energy Conversion Dept.
FABRICATION OF ONE SILICON-GERMANIUM THERMOELECTRIC TEST UNIT.
Final rept.,
by R. C. Fortin. 31 Aug 65, 44p
Contract NAS7-100
NASA CR-68794
Prepared in cooperation with Jet Propulsion Lab., Calif. Inst. of Tech., rept. no. JPL-951 136.

Descriptors: (*Thermoelectricity, Instrumentation).

N66-13826 **Field 10A**
CFSTI Prices: HC$1.00 MF$0.50
Borden Chemical Co., Philadelphia, Pa. Central Research Lab.
IMPROVED SEPARATORS FOR SILVER OXIDE-ZINC AND SILVER OXIDE-CADMIUM CELLS FOR SPACECRAFT APPLICATION.
Second quarterly progress rept. no. 2, 10 Feb-9 May 65,
by H. H. Hoyt and H. L. Pfluger. 1965, 19p
Contract NAS 5-9107
NASA CR-68847

Descriptors: (*Storage batteries, Materials), (*Primary cells, Battery separators), (*Spacecraft, Primary cells), Silver, Cadmium.

N66-13829 **Field 10A**
CFSTI Prices: HC$5.00 MF$1.00
Naval Ammunition Depot, Crane, Ind.
LIFE CYCLE TESTS.
Monthly progress rept.
31 Oct 65, 157p
Contract NASA Order W-11252-B
NASA CR-68845

Descriptors: (*Primary cells, Life expectancy).

11. MATERIALS

AD-449 664 **Field 11F, 20M, 13C**
CFSTI Price: HC$1.00
Navy Marine Engineering Lab., Annapolis, Md.
INVESTIGATION OF THE FRACTURE TOUGHNESS OF THICK PLATE METALLIC MATERIALS. PHASE I.
Research and development rept.,
by A. J. Skalican. 9 Oct 64, 19p MEL-202/64

Descriptors: (*Aluminum alloys, Metal plates), (*Metal plates, Fracture (Mechanics)), Toughness.

Identifiers: Frature toughness, Aluminum alloy 7079.

AD-453 994 **Field 11F, 19F, 20K**
CFSTI Prices: HC$3.60
Springfield Armory, Mass.
HIGH-RATE LOADING: EFFECT ON MECHANICAL PROPERTIES OF CR-MO-V AND 4340 STEEL AT AMBIENT TEMPERATURE.
Technical rept.,
by Hubert H. Cadle. 29 Oct 64, 34p SA-TR-18-1203
N65 18911

Descriptors: (*Steel, Gun barrels), (*Gun barrels, Steel), (*Loading (Mechanics), Steel), Chromium alloys, Molybdenum alloys, Vanadium alloys, Guns, Mechanical loading, Dynamics, Pipes.

Static and dynamic tests were conducted on thick-walled tubes to determine relative values for mechanical properties. The dynamic loading was produced in test specimens as a pressure pulse derived from the propellant gas discharged from a rifle. Results indicate an increase in yield strength of 10 per cent to 20 per cent under dynamic conditions. Procedure is given and results are discussed. (Author)

AD-454 764 **Field 11F, 11C**
CFSTI Price: $5.60
Naval Air Engineering Center, Philadelphia, Pa. Aeronautical Materials Lab.
AN EVALUATION OF THE ANTI-CORROSION EFFECTIVENESS OF VARIOUS PRIMER COATINGS,
by Jack Ohr. 9 Nov 64, 54p NAEC-AML-2072
Task RRMA-05-010/200-1/R007-08-01

Descriptors: (*Coatings, Corrosion inhibition), (*Aircraft, Metals), (*Metals, Salt spray tests), Epoxy plastics, Polyester plastics, Plastic coat ings, Antimony compounds, Oxides, Zinc compounds, Chromates, Strontium compounds, Titanium com pounds, Magnesium, Steel, Aluminum, Electroplating.

Identifiers: Tributylin oxides, Strontium chromate, Zinc chromate, Titanium dioxide, Antimony oxide.

Salt Spray tests were conducted with magnesium-steel and magnesium-aluminum couples coated with alkyd and epoxy primers pigmented respectively with zinc chromate, strontium chromate, a mixture of zinc chromate and antimony oxide, and titanium dioxide. Results indicate that the optimum formulation for protecting the couples against corrosion is an epoxy-polyamide primer pigmented with the zinc chromate-antimony oxide

mixture. Recommendation for the use of this coating is withheld pending the outcome of future work to determine its practicability as a primer for aircraft use. (Author)

AD-461 057 **Field 11J, 7C**
CFSTI Price: HC$2.00
Peninsular ChemResearch, Inc., Gainesville, Fla.
SYNTHESIS AND POLYMERIZATION OF FLUIED NITROSO RUBBER.
Quarterly rept. no. 4, 1 Apr-30 Jun 64,
by Eugene C. Stump and Calvin D. Padgett. 21 Jul 64, 29p
Contract DA-19-129-AMC-152 (N),
Proj. DA-1K024401A113
See also AD-447 062.

Descriptors: (*Synthetic rubber, Preparation), (*Fluorine compounds, Synthetic rubber), (*Organic sulfur compounds, Synthetic rubber), Synthesis (Chemistry), Polymerization, Halogenated hydrocarbons, Aromatic compounds, Catalysis.

Identifiers: Nitroso rubber.

Attempts to prepare SF5CF (NO)CF2Cl and C2H5SNO are described. Several mono- and difunctional perfluoroaromatic monomers and precursors have been synthesized. Routes to SF5COOH and SF5CF2COOH are discussed. Low temperature polymerization of F2C=S with CF3NO, CF2=CF2 and CF3NO/CF2=CF2 was attempted using a triethylborane/oxygen catalyst. A coordination catalyst was used to polymerize CF3NO/CF2=CF2. The new monomer CF3SCF (NO)CF3 Cl is relatively non-reactive compared with CF3NO. (Author)

AD-461 060 **Field 11J, 7C**
CFSTI Price: HC$2.00
Peninsular ChemResearch, Inc., Gainesville, Fla.
SYNTHESIS AND POLYMERIZATION OF FLUORINATED SULFUR MODIFIED NITROSO RUBBER.
Quarterly rept. no. 5, 1 Jul-30 Sep 64,
by Eugene C. Stump, Ward A. Oliver, Calvin D. Padgett and Larry Sapp. 21 Oct 64, 37p
Contract DA-19-129-AMC-152 (N),
Proj. DA-1K024401A113
N65 33514

Descriptors: (*Synthetic rubber, Preparation), (*Fluorine compounds, Synthetic rubber), (*Organic sulfur compounds, Synthetic rubber), (*Organic nitrogen compounds, Synthetic rubber), Synthesis (Chemistry), Polymerization, Dienes, Halogenated hydrocarbons, Butadienes, Nuclear magnetic resonance, Silver com pounds, Benzoates, Nitrites.

Identifiers: Nitroso rubber.

A number of fluorine-containing diolefine were used as comonomers or termonomers. Perfluorobutadiene gives an elastic gum with CF3NO. A terpolymer of CF3SCF (NO)CF2Cl with CF3NO/CF2=CF2 was prepared. Low molecular weight nitroso polymer was prepared for NMR analysis. The use of chain transfer agents to obtain predetermined end groups is being examined. Efforts to prepare SF5COOH and SF5CF2COOH continued. Silver pentafluorobenzoate was reacted with nitrosyl chloride to give pentafluorobenzoyl nitrite, which apparently decarboxylates slowly under vacuum to give pentafluoronitrosobenzene. p-Nitrosotetrafluorobenzoic acid was not isolated from the pyrolysis of tetrafluoroterephthaloytm ononitrite. Nearly 400 g. of CF3NO were prepared. (Author)

AD-466 612 **Field 11I**
CFSTI Prices: HC$1.00 MF$0.50
Naval Ordnance Lab., White Oak, Md. Non-Metallic Materials Div.
INFRARED ANALYSIS OF THE POLYMERIZATION AND LONG-TERM STABILITY OF EPOXY RESINS.
Final rept.,
by Doris V. Steele. 16 Jun 65, 24p
Task NOL-417
NOLTR 65-84,
N65 29911

Descriptors: (*Epoxy plastics, Spectra (Infrared)), (*Infrared spectroscopy, Epoxy plastics), Spectrum signatures, Polymerization, Stability, Storage, Resistance (Electrical), Band spectrum.

Identifiers: Potting compounds.

Infrared analysis of epoxy resins utilizes the known fingerprint for these polymers at 2.95, 10.93 and 11.6 microns bands. Five epoxy compounds were studied and the polymerization monitored during 18 months storage time. Three systems reached a stable condition in less than two months, and two systems were still unstable after 18 months storage time. These data correlate extremely well with electrical resistivity data obtained for three of the systems studied. Both electrical resistivity data and infrared analysis provide a sensitive means of determining the long-term stability of epoxy resin systems. (Author)

AD-467 450 **Field 11A, 11I, 7C**
CFSTI Prices: HC$1.00 MF$0.50
Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
PREPARATION OF POLYPHENYLENE.
Technical rept.,
by E. A. Hoess and E. L. O'Brien. Jul 65, 17p
Proj. DA-1A024401A110
PA TR-3236

Descriptors: (*Heat-resistant plastics, Preparation), (*Adhesives, Preparation), (*Phenolic plastics, Preparation), Polymerization, Catalysis, Hydrogen, Amines, Halogenated hydrocarbons.

Identifiers: Polyphenylenes, Wurtz-Fittig reaction.

The synthesis of polyphenylene by conventional means and by a catalyzed Wurtz-Fittig reaction, as well as by modifications of the Wurtz-Fittig reaction, are described. (Author)

AD-467 954 **Field 11H, 7C**
CFSTI Prices: HC$1.00 MF$0.50
Peninsular ChemResearch, Inc., Gainesville, Fla.
SYNTHESIS OF NEW FIRE RESISTANT HYDRAULIC FLUIDS.
Bimonthly status rept. no. 2, 25 May-25 Jul 65,
by Eugene C. Stump and Stephen E. Rochow. 25 Jul 65, 15p
Contract NObs-92265

Descriptors: (*Hydraulic fluids, Synthesis (Chemistry)), (*Fire-resistant materials, Hydraulic fluids), (*Haloge nated hydrocarbons, Hydraulic fluids), Freons, Lithium compounds, Metalorganic compounds, Carbon dioxide, Fluorine compounds, Chlorine compounds, Silanes, Siloxanes, Viscosity, Flammability, Organic sulfur compounds, Polymers, Ethers.

Identifiers: Fluorosiloxanes, Polyfluoroethers, Thioethers, Trifluoromethane sulfenyl chloride.

The reaction of Freon E3, butyl lithium and carbon dioxide gives a compound tentatively identified as C3F7O (C3F6O)2CF=CFC4H9. Dimethylchlorosilane was added to CH2=CHC3F7 to give C1 (CH3)2SiCH2CH2C3F7 in better than 50% conversion. The adduct was hydrolyzed to give (C3F7CH2CH2Si (CH3)2)2O. Model disiloxanes exhibit both low viscosity and low flash points. Trifluoromethane sulfenyl chloride was added to chlorotrifluoroethylene to give high boiling telomers. Two pure telomeric adducts were isolated and found to have unsuitably low viscosities. (Author)

BNWL-166 **Field 11F, 18J**
CFSTI Prices: HC$3.00 MF$0.75
Battelle-Northwest, Richland. Wash. Pacific Northwest Lab.
METALLURGY RESEARCH SECTION.
Quarterly progress rept. Jul - Sep 65.
15 Oct 65, 82p
Contract AT (45-1)-1839

Descriptors: (*Reactor materials, Metallurgy), (*Metallurgy, Nuclear engineering).

BNWL-37 **Field 11F, 18J**
CFSTI Prices: HC$6.00 MF$1.25
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
PLUTONIUM METALLURGY NOTEBOOK,
by M. E. Hasbrouck and M. P. Burns. Sep 65, 211p
Contract AT (45-1)-1830

Descriptors: (*Plutonium, Reactor materials), (*Metallurgy, Plutonium).

CNLM-5942 **Field 11B, 11F, 11G**
CFSTI Prices: HC$2.00 MF$0.50
Pratt and Whitney Aircraft, Middletown, Conn. Aircraft Nuclear Engine Lab.
A STUDY OF THE COMPATIBILITY OF SELECTED REFRACTORY METALS WITH VARIOUS CERAMIC INSULATION MATERIALS,
by D. E. Fornwalt, B. R. Gourley, andA. V. Manzione. 30 Nov 64, 26p
Contract AT (30-1)-2789

Descriptors: (*Refractory metals, Compatibility), (*Electric insulation, Ceramic materials), Thermal insulation.

EURAEC-1095 **Field 11F, 18J**
CFSTI Prices: HC$4.00 MF$0.75
Commissariat a Lenergie Atomique, Saclay (France). Centre Detudes Nucleaires.
THERMAL CONDUCTIVITY OF SINTERED URANIUM OXIDE UNDER IN-PILE CONDITIONS.
Special rept. no. 10,
by Jean-Pierre Stora, Bruno De Bernardy de Sigover,Roger Delmas, and Claude Ringot. Aug 64, 117p CEA-R-2586
Contract 031-60-10-RDF

Descriptors: (*Reactor fuel elements, Thermal conductivity), (*Uranium compounds, Oxides).

EURAEC-1099 **Field 11F**
CFSTI Prices: HC$3.00 MF$0.75
Bologna Universita (Italy). Istituto Di Fisica A Righi.
THE MECHANISM OF DIFFUSION AND PRECIPITATION OF HYDROGEN IN ZIRCONIUM AND ITS ALLOYS. PERIOD COVERED MAY 1 - AUGUST 31, 1964.
31 Aug 64, 63p
Contract 026-64-3-TEE 1 (RD)

Descriptors: (*Zirconium, Diffusion), (*Hydrogen, Zirconium alloys).

EURAEC-1238 **Field 11F, 18H**
CFSTI Prices: HC$2.00 MF$0.50
Societa Ricerche Impanti Nucleair. Centro Ricerche Nucleari, Saluggia (Italy).
INFLUENCE OF NITROGEN IN IRON AND STEEL UNDER FAST NEUTRON IRRADIATION.

Quarterly rept. no. 4, 1 Jul - 30 Sep 64,
by F. Rossi. Oct 64, 20p
Contract 004-60-10-TEEI (RD)

Descriptors: (*Iron alloys, Impurities), (*Radiation damage, Iron alloys), Nitrogen, Neutron reactions.

EURAEC-1282 **Field 11F, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Institut de Recherches de la Siderugrie, St.-German-Enlaye (France).
STUDY OF BASE METAL TO BE USED IN RESEARCH ON BRITTLE FRACTURE OF LARGE WELDED ASSEMBLIES. IMPACT STRENGTH, ROBERTSON AND PELLINI TESTS ON SUPER ELSO NICKEL - CHROMIUM STEEL.
Quarterly rept no. 3, 1 Sep - 31 Dec 64.
Jan 65, 12p
Contract 031-64-5 TEEF

Descriptors: (*Steel, Welds), (*Welds, Brittleness), Toughness, Fracture (Mechanics).

N66-12875 **Field 11C, 11F**
CFSTI Prices: HC$1.00 MF$0.50
Union Carbide Corp., Parma, Ohio. Carbon Products Div.
HIGH TEMPERATURE PROJECTIVE COATINGS FOR REFRACTORY METALS.
Progress rept. no. 3, 1 May-31 Jul 65,
by J. M. Criscione, R. G. Fenish, and J. Rexer.
1965, 22p
Contract NASw-1030
NASA CR-68181

Descriptors: (*Refractory metals, Coatings), (*Coatings, Refractory metals), Protective treatments, Electrodeposition, Iridium, Diffusion bonding, Tantalum.

N66-12929 **Field 11F, 7D, 20L**
CFSTI Prices: HC$3.00 MF$0.75
Advanced Technology Labs., Mountain View, Calif.
RESEARCH ON DIFFUSION OF HYDROGEN THROUGH PALLADIUM-SILVER ALLOY, PHASE 3.
Final rept. Apr 64 - May 65,
by R. C. Bachmann. 31 May 65, 96p ATL-D-1306
Contract NAS7-118
NASA CR-68185

Descriptors: (*Palladium alloys, Silver alloys), (*Hydrogen, Diffusion).

N66-13096 **Field 11D, 13H**
CFSTI Prices: HC$1.00 MF$0.50
IIT Research Inst., Chicago, Ill.
GRAPHITE-METAL COMPOSITES.
Quarterly rept no. 1, 1 Aug - 1 Nov 65,
by Y. Harada. 18 Oct 65, 22p IITRI-G6003-1
Contract NASR-65 (09)
NASA CR-68387

Descriptors: (*Composite materials, Graphite), (*Hot working, Composite materials), Metal, Niobium, Hafnium, Molybdenum.

N66-13552 **Field 11F**
CFSTI Prices: HC$1.00 MF$0.50
Syracuse Univ. Research Inst., N. Y. Dept. of Chemical Engineering and Metallurgy.
CREEP AT ELEVATED TEMPERATURES AND HIGH VACUUM.
Semiannual rept. no. 3, 1 May-31 Oct 65,
by A. Giannuzzi, K. Schroder, and G. Gorsha.
Nov 65, 21p MET-E-1189-1165-SA
Grant NsG-619
NASA CR-68735

Descriptors: (*Creep, Copper), High temperature research, Vacuum.

N66-13554 **Field 11B**
CFSTI Prices: HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
TENSILE AND STRUCTURAL PROPERTIES OF GLASSY CARBON,
by D. B. Fischbach and W. V. Kotlensky. 15 Nov 65, 17p JPL-TR-32-842
Contract NAS7-100
NASA CR-68788

Descriptors: (*Carbon compounds, Tensile properties), (*Structural properties, Carbon), Controlled atmospheres, Helium, High temperature research.

N66-13572 **Field 11B**
CFSTI Prices: HC$4.00 MF$1.00
IIT Research Inst., Chicago, Ill.
DEVELOPMENT OF LIGHTWEIGHT THERMAL INSULATION MATERIALS FOR RIGID HEAT SHIELDS.
Summary rept. no. 1, 25 Jun 64-25 Jun 65,
by A. J. Mountvala, H. H. Nakamura, and H. L. Rechter. 25 Jun 65, 146p IITRI-G6002012
Contract NAS8-11333
NASA CR-68709

Descriptors: (*Heat shields, Launch vehicles (Aerospace).

N66-13636 **Field 11B**
CFSTI Prices: HC$1.00 MF$0.50
Stanford Univ., Calif. Dept. of Materials Science.
MECHANICAL BEHAVIOR OF POLYCRYSTALLINE NON-METALLICS AT ELEVATED TEMPERATURE.
Progress rept. 1 Apr-30 Sep 65,
by P. Burke and O. D. Sherby. 1965, 14p
Contract NGR-05-020-084
NASA CR-68583

Descriptors: (*Aluminum compounds, Oxides), (*Sodium compounds, Chlorides).

N66-13838 **Field 11I**
CFSTI Prices: HC$3.00 MF$0.75
Stanford Research Inst., Menlo Park, Calif.
DEVELOPMENT OF SPECIFICATIONS FOR POLYMERIC MATERIALS.
Interim rept. no. 1, Jun 64-Aug 65.
9 Aug 65, 84p
Contract NAS7-100
NASA CR-68784
Prepared in cooperation with Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena, rept. no. JPL-950 745.

Descriptors: (*Polymers, Spacecraft).

N66-14238 **Field 11F, 20B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
ROOM-TEMPERATURE TENSILE BEHAVIOR OF (100) ORIENTED TUNGSTEN SINGLE CRYSTALS WITH RHENIUM IN DILUTE SOLID SOLUTION,
by M. Garfinkle. Jan 66, 17p NASA-TN-D-3190

Descriptors: (*Tungsten alloys, Rhenium alloys), (*Single crystals, Tungsten alloys), Tensile properties, Solid solutions, Tungsten.

N66-14239 **Field 11F, 13H, 20B**
CFSTI Prices: HC$3.00 MF$0.50
Ilikon Corp., Natick, Mass.
BASIC STUDIES ON DISPERSION HARDENING,
by L. J. Bonis and R. Grierson. Jan 66, 60p
Contract NASw-726
NASA CR-360

Descriptors: (*Dispersioning hardening, Alloys), Cold working, Electron microscopy, X-ray diffraction analysis, Crystal substructure.

N66-14706 **Field 11I**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
INVESTIGATION OF BONDED PLASTIC TAPE FOR LINING FILAMENT-WOUND FIBER-GLASS CRYOGENIC PROPELLANT TANKS,
by R. W. Frischmuth, Jr. and P. T. Hacker. Jan 66, 48p NASA-TN-D-3206

Descriptors: (*Propellant tanks, Plastic coatings), Glass textiles, Cryogenics.

N66-14707 **Field 11I**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.
INVESTIGATION OF THIN FILMS AS FLOATING LINERS FOR FIBER-GLASS CRYOGENIC PROPELLANT TANKS,
by R. W. Frischmuth, Jr. Jan 66, 31p NASA-TN-D-3205

Descriptors: (*Propellant tanks, Coatings), Thin films, Glass textiles, Cryogenics.

N66-14712 **Field 11F**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
INFLUENCE OF PROGRAMMING TECHNIQUES AND OF VARYING LIMIT LOAD FACTOR ON MANEUVER LOAD FATIGUE TEST RESULTS,
by P. L. Corbin and E. C. Naumann. Jan 66, 21p NASA-TN-D-3149

Descriptors: (*Aluminum alloys, Fatigue (Mechanics), (*Aircraft, Materials).

N66-14757 **Field 11F**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
EFFECT OF COLD REDUCTION AND THERMAL TREATMENT ON TENSILE PROPERTIES OF A NICKEL-2 PERCENT BERYLLIUM ALLOY AT CRYOGENIC TEMPERATURES,
by T. W. Orange. Jan 66, 19p NASA-TN-D-3196

Descriptors: (*Nickel alloys, Tensile properties), (*Beryllium alloys, Tensile properties).

N66-14758 **Field 11A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
DYNAMIC INSTABILITY OF UNDAMPED BELLOWS FACE SEALS IN CRYOGENIC LIQUID,
by J. C. Hudelson. Jan 66, 21p NASA-TN-D-3198

Descriptors: (*Bellows, Seals (Stoppers)), (*Seals (Stoppers), Stability).

N66-14908 **Field 11B**
CFSTI Prices: HC$1.00 MF$0.50

National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
EXPERIMENTAL INVESTIGATION OF GLASS FLAKES AS A LINER FOR FIBER-GLASS CRYOGENIC PROPELLANT TANKS,
by R. W. Frischmuth, Jr. Jan 66, 17p NASA-TM-X-1193

Descriptors: (*Propellant tanks, Coatings), Storage tanks, Epoxy plastics, Glass, Cryogenics.

NAA-SR-11191 **Field 11F, 13K, 18N**
CFSTI Prices: HC$2.00 MF$0.50
Atomics International, Canoga Park, Calif.
METALLURGICAL STUDY AND NIOBIUM/TYPE 316 STAINLESS STEEL DUPLEX TUBING,
by F. B. Ferry and J. P. Page. 5 Jan 65, 32p
AT (11-1)-GEN-8

Descriptors: (*Boiler tubes, Composite materials), (*Refractory metals, Boiler tubes), (*Stainless steel, Boiler tubes).

NAA-SR-11326 **Field 11F, 18J, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Atomics International, Canoga Park, Calif.
AN INVESTIGATION OF NICKEL-BASE BRAZING ALLOYS AND BRAZED JOINTS FOR SERVICE IN LIQUID SODIUM,
by Suk K. Lee. 15 Dec 65, 35p
AT (11-1)-GEN-8

Descriptors: (*Sodium graphite reactors, Brazing), (*Soldering alloys, Nickel alloys), Metal joints.

PB-169 454 **Field 11E, 1E, 11I**
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
HIGH-SPEED ABRASION OF TEXTILE CORDAGE ON CONCRETE,
by J. E. Swallow and M. W. Webb. Oct 65, 23p
Technical rept. no. TR-65227

Descriptors: (*Textiles, Wear resistance), (*Concrete, Abrasives), Runways, Great Britain, Aircraft industry, Nylon, Polyester plastics, Propenes, Polymers.

Braided cords of nylon, polyester and polypropylene fibres were abraded at high speed on concrete. Velocity, tension (controlling normal pressure) and time of abrasion were varied factorially. Response equations giving the dependence of abrasion on the factors were obtained for each cord. Correlation of calculated with experimental results ranged from 0.72 to 0.83, and the standard errors of the calculated strengths were about 30 kg for each cord. (Author)

RFP-659 **Field 11B, 11A**
CFSTI Prices: HC$1.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
EVALUATION OF BINDERS FOR MACHINABLE UNFIRED CERAMICS,
by A. R. Teter. 10 Dec 65, 8p
Contract AT (29-1)-1106

Descriptors: (*Binders, Ceramic materials), (*Ceramic materials, Machinability).

TID-21328 **Field 11F, 20B, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Franklin Inst., Philadelphia, Pa. Labs. for Research and Development.
FRANKLIN INSTITUTE ANNUAL REPORT.
27 Nov 64, 24p
Contract AT (30-1)-3347

Descriptors: (*Metal films, Crystal structure), (*Glass, Metal films).

TID-21379 **Field 11A**
CFSTI Prices: HC$4.00 MF$0.75
Tennessee Univ., Knoxville. Dept. of Mechanical Engineering.
A BIBLIOGRAPHY ON DYNAMIC SHAFT SEALS,
by William K. Stair. May 62, 101p ME-5-62-3

Descriptors: (*Seals, Gas-cooled reactors), (*Shafts, Seals).

UCRL-14437 **Field 11F, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
MELTING, FABRICATION, AND CREEP TESTING OF A 1.39 PERCENT TI and 0.34 PERCENT ZR and 0.30 PERCENT C MOLYBDENUM ALLOY,
by H. F. Conrad and P. R. Landon. 1 Nov 65, 23p
Contract W-7405-eng-48

Descriptors: (*Molybdenum alloys, Metallurgy).

12. MATHEMATICAL SCIENCES

N66-12969 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Pittsburgh Univ., Pa. Space Research Coordination Center.
PROJECTIVE-SYMMETRIC SPACES,
by R. F. Reynolds and A. H. Thompson. 22 Oct 65, 14p Rept. no. 16
Grant NsG-416
NASA CR-68311

Descriptors: (*Projective geometry, Theory), Tensor analysis, Algebraic topology.

N66-14710 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Houston, Tex. Manned Spacecraft Center.
THE GENERATION OF A RANDOM SAMPLE-COVAR- IANCE MATRIX,
by A. H. Feiveson. Jan 66, 19p NASA-TN-D-3207

Descriptors: (*Trajectories, Analysis), Algorithms.

Identifiers: Random sampling.

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

AD-441 927 **Field 13J**
CFSTI Prices: HC$4.60
Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
PRELIMINARY EVALUATION OF A LARGE-BULB SHIP FOR HIGH-SPEED OPERATION IN SMOOTH WATER AND IN ROUGH SEAS,
by Paul R. Van Mater, Jr. May 64, 46p Rept. no. R-834
N64 31712

Descriptors: (*Ships, Design), Ship hulls, Ship structural components.

Identifiers: Large-bulb ships.

This report describes an experimental investigation of the behavior in calm water and in waves of a model equipped with extremely large bow- and stern-bulbs. Results of the calm-water resistance tests are presented for the model without bulbs, and for the model with the bulbs in three different configurations. Results are also presented for tests of one model configuration both in regular and irregular waves. On the basis of the test results, the performance of the large-bulb ship is evaluated in comparison with other hull types. Practical advantages and disadvantages of the design concept for naval application are discussed. (Author)

AD-442 203 **Field 13L, 1E**
CFSTI Price: HC$5.60
Tactical Air Command, Langley AFB, Va.
OPERATIONAL TEST AND EVALUATION MB-4 FIRE FIGHTING TRUCK.
Technical rept.
Nov 61, 52p TAC-TR-59-12

Descriptors: (*Firefighting vehicles, Aviation accidents), Crash vehicles, Air force equipment.

Identifiers: MB-4 Trucks.

The MB-4 fire fighting and crash rescue truck proved to be distinctly superior in vehicular performance to similar trucks in use today. Its fire fighting potential, while designed to be superior to the 0-11A and 0-11B now in use, was severely limited by a completely unsatisfactory roof reel foam handline installation. These hanlines did not function sufficiently well to be used in the conventional manner on large fires with any degree of safety. With the agreed upon relocation of the two foam handlines to a more conventional front mounted reel, this truck should satisfactorily fulfill TAC's requirement for a replacement for the 0-11A and 0-11B series fire trucks. (Author)

AD-467 044 **Field 13J**
CFSTI Prices: HC$2.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Hydromechanics Lab.
COMPUTATION OF OSCILLATORY LOADS ON A SUPERCAVITATING HYDROFOIL,
by Jon Patton and Avis Borden. Aug 65, 43p
Projs. S-F013-02-01, SS600-000,
Tasks 1702, 1703
DTMB 1840

Descriptors: (*Hydrofoils, Loading (Mechanics)), Oscillation, Cavitation, Functions, Moments, Frequency.

Frequency functions and unsteady lift and moment coefficients for a hydrofoil oscillating sinusoidally in pitch and heave were computed for an airfoil fitted with a spoiler. A cavity of infinite length is assumed to spring from an arbitrary point on the upper surface of the hydrofoil and extend aft to the trailing edge. Computed frequency coefficients and loading coefficients are tabulated for six locations of the separation point over a range of reduced frequencies from 0.01 to 20.0. (Author0

AD-473 532 **Field 13J, 20D**
CFSTI Prices: HC$6.00 MF$1.25
Hydronautics, Inc., Laurel, Md.
HANDBOOK OF CAVITATION DAMAGE.
Mar 65, 246p Technical rept. TR-233-8
Contract Nonr-3755 (00),
Proj. NR-062-293

Descriptors: (*Cavitation, Handbook), Hydrodynamics, Damage, Test facilities, Materials, Metals, Plastics, Polymers, Intensity, Viscoelasticity, Bubbles, Fluid flow, Ceramic materials, Ship hulls, Propellers (Marine), Flowmeters, Magnetostriction.

The handbook of Cavitation Damage contains a state-of-the art summary, a critical review of the problem for those in research, and a compilation of practical information for the use of the designer.

214-537 O - 66 - 17

The various theories of cavitation damage are discussed. A description of the various experimental research facilities and techniques of measurement, analysis and correlation is also included. Some recent results on the influence of the material and liquid properties and of the hydrodynamic parameters are presented. Methods to estimate the intensity of cavitation damage of field installations, protection methods and repair procedures are outlined in detail. Further areas of research are indicated.

EURAEC-1221 **Field 13H, 20K**
CFSTI Prices: HC$1.00 MF$0.50
Institut de Soudure, Paris, (France).
STUDY OF ELEMENTARY CRACKING PRELIMINARY STUDY OF WELDING PROCEDURE PROTOTYPE TESTS.
Quarterly rept. no. 7, 1 Jul - 30 Sep 64,
by H. Granjon. 23 Nov 64, 8p
Contract 090-62-12 RDF,
Proj. 206
EURAEC 1221

Descriptors: (*Arc welding, Fracture (Mechanics)), (*Steel, Arc welding).

EURAEC-1280 **Field 13H**
CFSTI Prices: HC$1.00 MF$0.50
Institut de Soudure, Paris (France).
STUDY OF JOINTS WELDED IN VERY THICK STEEL PLATES.
Quarterly rept no. 2, 1 Oct - 31 Dec 64.
30 Jan 65, 10p
Contract 007-64 TEEF (RD)

Descriptors: (*Metal plates, Welding), (*Welding, Steel).

N66-12803 **Field 13H, 12A**
CFSTI Prices: HC$1.00 MF$0.50
Stanford Univ., Calif. Dept. of Statistics.
STATISTICAL CONTROL OF A NORMAL PROCESS,
by H. M. Taylor. 7 Sep 65, 24p TR-82
Contract Nonr-225 (53)
ADN 622828

Descriptors: (*Quality control, Industrial production), (*Statistical analysis, Production control), Processing.

N66-13076 **Field 13H**
CFSTI Prices: HC$6.00 MF$1.25
Battelle Memorial Inst., Columbus, Ohio.
WELDING-BASE METAL INVESTIGATION.
Final rept, 27 Jun 64-28 Jul 65,
by D. L. Cheever, P. A. Kammer, D. C. Martin, andR. E. Monroe. 28 Jul 65, 217p
Contract NAS8-11445
NASA CR-68412

Descriptors: (*Aluminum alloys, Welds), (*Welds, Aluminum alloys), Arc welding.

N66-13085 **Field 13L, 21B**
CFSTI Prices: HC$2.00 MF$0.50
Bureau of Mines, Pittsburgh, Pa.
HYDROGEN SAFETY.
Progress rept no. 6, 1 Apr - 30 Jun 65,
by J. Grumer, E. L. Litchfied, A. Strasser, andR. A. Van Meter. Jul 65, 27p
NASA CR-68453

Descriptors: (*Hydrogen Safety), Storage, Handling, Monitors, Hazards, Liquified gases.

N66-13100 **Field 13H, 11F, 22B**
CFSTI Prices: HC$4.00 MF$1.00
Lockheed Missiles and Space Co., Sunnyvale, Calif. Space Systems Div.
BERYLLIUM FABRICATION METHODS DEVELOPMENT PROGRAM. METAL REMOVAL.
Apr 65, 135p LMSC-A730586, SSD-11798-65-1
Contract NAS8-11798
NASA CR-68401

Descriptors: (*Machining, Beryllium), (*Beryllium, Aerospace craft), Metal removal.

N66-13127 **Field 13H**
CFSTI Prices: HC$1.00 MF$0.50
Westinghouse Electric Corp., Pittsburgh, Pa. Astronuclear Lab.
BONDING OF A PYROLYTIC GRAPHITE HYPERVELOCITY IMPACT TARGET.
Final rept.,
by H. C. Nicholson. 15 Sep 65, 13p WANL-PR/FF/-001
Contract NASA Order C-67076-A
NASA CR-54734

Descriptors: (*Pyrolytic graphite, Bonding), (*Hypervelocity projectiles, Pyrolytic graphite).

N66-13849 **Field 13A**
CFSTI Prices: HC$4.00 MF$1.00
Lockheed-Georgia Co., Marietta.
AN EXPERIMENTAL INVESTIGATION OF INTERNAL RESISTANCE SHOCK TUBE DRIVER GAS HEATING SYSTEMS.
Final report,
by D. E. Alford and R. F. Sturgeon. 26 Apr 65, 137p ER-7823
Contract NAS8-11349
NASA CR-68771

Descriptors: (*Shock tubes, Heating).

N66-14784 **Field 13E**
CFSTI Prices: HC$7.00 MF$2.25
Standard Pressed Steel Co., Jenkintown, Pa.
EVALUATION OF FASTENERS AND FASTENER MATERIALS FOR SPACE VEHICLES,
by J. J. Glackin and E. F. Gowen, Jr. Jan 66, 428p
Contract NAS8-11125
NASA CR-357

Descriptors: (*Fastenings, Spacecraft), Rivets, Bolts, Alloys, Materials.

ORNL-TM-1097 **Field 13K**
CFSTI Prices: HC$2.00 MF$0.75
Oak Ridge National Lab., Tenn.
TRU DISCONNECT FERRULE AND CLAMP DETAILS.
by O. O. Yarbro. May 65, 41p
Contract W-7405-eng-26

Descriptors: (*Disconnect fittings, Reactor fuel pro cessing), (*Mechanical drawing, Disconnect fittings).

PB-169 406 **Field 13B, 9C**
CFSTI Prices: HC$8.85 MF$2.50
Bureau of Public Roads, Washington, D. C.
CONFERENCE ON IMPROVED HIGHWAY ENGINEERING PRODUCTIVITY, MAY 19-21, 1965, PROCEEDINGS.
1965, 584p

Descriptors: (*Roads, Symposia), (*Civil engineer ing, Roads), (*Electronics, Civil engineering), (*Management engineering, Roads), Data processing systems, Systems engineering.

The purpose of this three-day conference was to discuss electronics in highway transportation as applied to highway engineering, administration, and communications. Representatives from State highway departments, research organizations, and industry, as well as specialists from the Bureau of Public Roads, presented papers and participated in panel discussions.

PB-169 553 **Field 13B, 20F, 13L**
CFSTI Price: HC$6.00
Bureau of Public Roads, Washington, D. C.
COLOR TOLERANCE CHARTS FOR MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS.
Jun 61, 4p
For manual see C 37.6/2: T67: available from GPO only.

Descriptors: (*Colors, Standards), (*Traffic, Control systems), (*Roads, Visual signals), Civil engineering, Colorimetry, Paints, Visibility, Safety devices, Visual perception, Motor vehicle operators, Graphics.

Identifiers: Color tolerance charts, Highway signs.

The Color Tolerance Charts have been prepared by the U. S. Bureau of Public Roads for the convenience of users and manufacturers of highway signs to promote uniformity. Each Color Tolerance Chart provides a set of standards that can be used to implement a specification. The color standards are in terms of Munsell Notations. Each Color Tolerance Chart has three visual dimensions or parameters and is constructed to show the desired color and a number of colors representing the maximum color differences permissible for each of these three parameters. Charts representing highway yellow, red, green, and blue are included.

Y-1487 **Field 13H, 14B**
CFSTI Prices: HC$3.00 MF$0.75
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
ISOSTATIC HOT PRESSING,
by R. P. Levey. 9 Jun 65, 69p
Contract W-7405-eng-26

Descriptors: (*Powder metallurgy, Hot working).

Y-1498 **Field 13I**
CFSTI Prices: HC$2.00 MF$0.50
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
EVALUATION OF A DUPLICATOR LATHE WITH HYDROSTATIC BEARING SLIDES AND AN ELECTRO-HYDRAULIC CONTROL SYSTEM,
by J. B. Richards. 26 Aug 65, 24p
Contract W-7405-eng-26

Descriptors: (*Lathes, Control systems), (*Machine tools, Lathes).

14. METHODS AND EQUIPMENT

AD-451 305 **Field 14B, 13A**
CFSTI Price: HC$2.60
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
NON-CONTAMINATING COMBUSTION AIR HEATER FOR WIND TUNNELS.
Technical documentary rept.,
by Robert O. Dietz. Nov 64, 25p AEDC-TDR-64-185

Descriptors: (*Hypersonic wind tunnels, Heaters), Analysis, High-temperature research, Combustion, Oxides, Density, Air, Pressure, Thermodynamics, Construction, Costs, Fuels, Configuration, Combustion chambers, Particles.

An analysis of a wind tunnel combustion air heater

that will provide uncontaminated air at temperatures above 4000R is presented. Concept of the heater involves combustion of metals that yield oxides having melting temperatures above 4000R. Heat is transferred to air from liquid metal-oxide particles formed in a metal-oxygen combustor. The oxide particles solidify during the heat-transfer process and are separated from the air by centrifugal forces. A portion of the heated air is bled from the periphery of the separator to carry the oxide particles out of the wind tunnel air supply system. Calculations presented show that five-micron aluminum-oxide particles can be separated from high density air using a tangential velocity of 200 ft/sec in a centrifugal separator. Experimental research needed to verify the results of the analyses and to provide design data are outlined.

AD-453 973 **Field 14B**
CFSTI Price: $2.60
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
THE DESIGN OF A TOTAL RADIATION THERMOPILE DETECTOR.
Technical documentary rept.,
by D. F. Frazine. Jan 65, 28p AEDC-TDR-64-271
Contract AF 40 (600)-1000,
Proj. ARO-SW3410
Prepared in cooperation with ARO, Inc., Arnold Air Force Station, Tenn.

Descriptors: (*Thermocouples, Temperature control), Space simulation chambers, Vacuum apparatus, Radiometers, Automatic, Control systems, Detectors.

A thermopile detector suitable for measuring and controlling irradiance in vacuum is described. Notable characteristics of the detector include its small physical size and output signal zero stability. Electrical heating is provided to maintain the detector case at a nearly constant temperature. Construction details along with results of detector tests made under vacuum conditions are given. (Author)

N66-10879 **Field 14B**
CFSTI Prices: HC$4.00 MF$1.00
Giannini Controls Corp., Duarte, Calif., Control/Nucleonics Div.
FEASIBILITY STUDY FOR AN X-RAY BACKSCATTER AIR DENSITY SENSOR.
Final rept.,
by D. B. Hakewessell. 8 Apr 64, 126p GCC-ER-80157
Contract NAS1-2306
NASA CR-67729

Descriptors: (*X-rays, Density), (*Monitors, X-rays), Measurement, Air, Test equipment.

N66-12867 **Field 14B, 4A**
CFSTI Prices: HC$2.00 MF$0.50
GCA Technology Div., GCA Corp., Bedford, Mass.
LANGMUIR PROBES FOR MEASUREMENTS IN THE IONOSPHERE,
by L. G. Smith. Oct 65, 49p GCA-TR-65-25-N
Contract NASw-1141
NASA CR-68188

Descriptors: (*Ionosphere, Electron density), (*Langmuir probes, Sounding rockets), Atmosphere sounding.

N66-12924 **Field 14B, 4B, 17B**
CFSTI Prices: HC$7.48 MF$2.25
Aracon Geophysics Co., Concord, Mass.
NIMBUS I SPACECRAFT - TWO TELEVISION CAMERA SYSTEMS - ADVANCED VIDICON CAMERA SYSTEM AND AUTOMATIC PICTURE TRANSMISSION SYSTEM.
Mar 65, 448p
Contract NAS5-3253
NASA CR-68190

Descriptors: (*Meteorological satellites, Television cameras), (*Television equipment, Meleorological satellites), Television transmitters, Automatic, Vidicons.

Identifiers: Nimbus.

N66-13015 **Field 14B**
CFSTI Prices: HC$2.00 MF$0.50
General Electric Co., Cincinnati, Ohio. Space Power and Propulsion Section.
POTASSIUM CORROSION TEST LOOP DEVELOPMENT - PURIFICATION AND ANALYSIS OF HELIUM FOR THE WELDING CHAMBER,
by T. F. Lyon. 1 Jul 65, 48p Topical rept. TP-1
Contract NAS3-2547
NASA CR-54168

Descriptors: (*Potassium, Corrosion), (*Welding, Gas), (*Helium, Purification).

N66-13164 **Field 14B, 21B, 21I**
CFSTI Prices: HC$4.00 MF$1.00
Rocketdyne, Canoga Park, Calif.
AN INSTRUMENTATION SYSTEM TO STUDY ROCKET EXHAUST PLUME RADIATIVE PROCESSES.
Final rept.,
by W. F. Herget. 27 Aug 65, 128p R-6288
Contract NAS8-11261
NASA CR-68540

Descriptors: (*Exhaust gases, Rockets), (*Monitors, Exhaust gases), Instrumentation, Heat transfer, Thermal radiation, Liquid rocket oxidizers, Oxygen.

N66-13228 **Field 14B, 20C, 9C**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
OPTIMUM DESIGN OF MAGNETIC BRAKING COILS WITH SPECIAL APPLICATION TO LEWIS DROP TOWER EXPERIMENTS.
Technical note,
by H. G. Kosmahl. Dec 65, 23p NASA-TN-D-3132.

Descriptors: (*Magnetic coils, Laboratory equipment), (*Magnetic brakes, Drop testing), Inductance.

N66-13505 **Field 14D, 12A, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Research Triangle Inst., Durham, N. C.
ON CERTAIN FUNCTIONALS OF NORMAL PROCESSES.
Technical rept. no. 1,
by J. D. Cryer and M. R. Leadbetter. Sep 64, 14p
Contract NASw-905
NASA CR-68700

Descriptors: (*Statistical processes, Quality control), (*Systems engineering, Reliability), Approximation (Mathematics), Stochastic processes.

N66-13517 **Field 14B, 13G, 20D**
CFSTI Prices: HC$6.00 MF$1.50
Michigan Univ., Ann Arbor. Lab. for Fluid Flow and Heat Transport Phenomena.
ON THE DETAILED FLOW STRUCTURE AND THE CORRESPONDING DAMAGE TO TEST SPECIMENS IN A CAVITATING VENTURI.
Technical rept. no. 16 (Doctoral thesis),
by M. J. Robinson. Aug 65, 249p Rept. no. 03424-16-T
Grant NsG-39-60
NASA CR-68695

Descriptors: (*Venturi tubes, Performance (Engineering)), Mechanical properties, Materials, Fluid flow, Cavitation.

N66-13518 **Field 14D, 12A**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
RELIABILITY GROWTH DURING A DEVELOPMENT TESTING PROGRAM,
by R. E. Barlow and E. M. Scheuer. Oct 65, 21p RM-4317-1-NASA
Contract NASR-21 (11)
NASA CR-68694

Descriptors: (*Systems engineering, Reliability), (*Reliability, Mathematical models), Statistical analysis, Failure (Mechanics).

N66-13553 **Field 14B, 6M, 6J**
CFSTI Prices: HC$1.00 MF$0.50
Minnesota Univ., Minneapolis.
THE BACTERIOLOGY OF CLEAN ROOMS.
Progress rept., 1 Apr-30 Sep 65,
by G. S. Michaelsen. 1965, 20p
Grant NsG-643
NASA CR-68729

Descriptors: (*Clean rooms, Bacteria), (*Bacteria, Clean rooms), Microbiology, Microorganisms.

N66-13968 **Field 14B**
CFSTI Prices: HC$3.00 MF$0.75
Rosemount Engineering Co., Minneapolis, Minn.
STUDY TO DETERMINE SUITABLE HIGH TEMPERATURE, HIGH ALTITUDE, TOTAL TEMPERATURE SENSORS.
Final report,
by R. V. De Leo and A. E. Saari. 5 Nov 65, 88p REC-116528
Contract NAS8-11191
NASA CR-68875

Descriptors: (*Temperature sensitive elements, Thermocouples).

N66-14159 **Field 14C**
CFSTI Price: MF$1.75
Athey (Skipwith W.), Palo Alto, Calif.
MAGNETIC TAPE RECORDING,
by S. W. Athey. Jan 66, 327p
Contract NASw-945
NASA SP-5038
Hard copy available from Superintendent of Documents, G.P.O., Washington, D. C., 20402, $1.25.

Descriptors: (*Magnetic recording systems, Operation), Magnetic tape.

PB-169 443 **Field 14C**
CFSTI Prices: HC$3.60 MF$0.50
Signals Research and Development Establishment, Christchurch (England).
AN INTRODUCTION TO MAGNETIC RECORDING,
by J. Singleton. Jul 65, 33p SRDE-N-47

Descriptors: (*Magnetic recording systems, Theory).

The article describes, from basic principles, the 'mechanics' of magnetic recording and reproduction. It has been written primarily to meet the needs of students and of junior scientists and technicians who use magnetic recorders as 'tools of the trade' in their everyday work. It does not cover the circuits used in the recording and reproducing processes, since these are adequately delt with elsewhere. (Author)

PB-169 489 **Field 14E, 13B**
CFSTI Prices: HC$3.00 MF$0.75
Kansas State Highway Commission.
AN EVALUATION OF COLOR AERIAL PHOTOGRAPHY FOR ENGINEERING PURPOSES.
Special rept. no. 1,
by Alvis H. Stallard, Gerald D. Hargadine, Dale R.Johnson and Dale P. Mahan. 1965, 63p Rept. no. 0341
Proj. 64-6
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Aerial photography, Civil engineering), (*Civil engineering, Aerial photography), (*Color photog raphy, Photogrammetry), Pavements, Photointerpreta tion, Construction, Degradation, Concrete.

The purpose of this investigation is to evaluate the usefulness of color aerial photography in comparison to that of black and white when conducting the two types of engineering projects discussed herein. It is known that color aerial photography provides the photo interpreter with the additional dimension of color contrast and a more natural image to observe and study; however, when certain engineering objectives are being considered it is not known if these advantages make color photography more useful to the interpreter than comparable black and white photography. The two projects included in this investigation were pavement deterioration studies and construction materials inventories. The different types of aerial photography that were utilized during this investigation were produced from DuPont Cronar Safety Film, Kodak Aero Ektachrome Film, and Agfacolor Negative Film. Black and white prints, color prints, and color transparencies obtained from the previously listed types of film were evaluated. Black and white photographs were further studied by using prints made on both glassy and semi-matte photographic paper.

RFP-672 **Field 14B, 18D, 11F, 11A**
CFSTI Prices: HC$1.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
AN ADHESION TESTER FOR EVAPORATED METAL FILMS,
by R. L. Beno. 11 Jan 66, 4p
Contract AT (29-1)-1106

Descriptors: (*Metal films, Adhesion), (*Test equipment, Metal films).

15. MILITARY SCIENCES

AD-455 526 **Field 15G, 15E**
CFSTI Price: HC$7.60
RAND Corp., Santa Monica, Calif.
THE ARMY DEPLOYMENT SIMULATOR,
by William F. Sharpe. Mar 65, 80p RM-4219-ISA (Abridged)
Contract SD-79

Descriptors: (*Deployment, Simulation), (*Army operations, Simulation), (*Air transportation, Pro gramming (Computers)), Transport planes, Armed forces operations, Armed forces supplies, Military tactics, Armed forces transportation.

The memorandum describes a computer program designed to simulate the deployment of army units via transport aircraft from peacetime locations to an area of actual or potential combat. The program is written in the FORTRAN IV language. The program requires as inputs a description of the locations of bases (onload, enroute and offload), the locations and compositions of various army units and prepositioned sets of equipment, the characteristics of various transport aircraft, and a statement of the priorities to be assigned to the airlift of different army units. Given the basic input data, the program: (1) Selects efficient routes for the various aircraft types to and from each of the onload bases. (2) Performs a detailed loading of each aircraft. (3) Allocates aircraft to onload bases. (4) Prepares a graph of the cumulative deliveries of personnel and cargo at the offload area during the deployment. Operations of considerable complexity can be simulated with relatively little computer time (typical cases require less than 10 minutes on an IBM 7044). (Author)

16. MISSILE TECHNOLOGY

PB-169 178 **Field 16D**
CFSTI Prices: HC$4.00 MF$1.00
Eidgenoessische Technische Hochschule, Zuerich (Switzerland). Institut fuer Flugzeugstatik und Leichtbau.
INVESTIGATION OF EFFECTS OF EXTREME STRUCTURAL FLEXIBILITY ON FLIGHT VEHICLES WITH FEEDBACK-CONTROL-SYSTEM STABILIZATION,
by Hubert I. Flomenhoft. 1965, 140p Mitt-7
Supported in part by NSF and North American Aviation, Inc.

Descriptors: (*Guided missiles, Flexural strength), Stabilization systems, Control systems, Feedback, Flight, Aerodynamic characteristics, Simulation, Mathematical analysis, Gyro stabilizers, Stresses, Switzerland.

The report presents the results of a study of the effects of extreme structural flexibility on the dynamic characteristics of a flight vehicle that requires an automatic feedback control system for stabilization. The vehicle chosen for this study is a hypothetical missile-type configuration having a long, very slender body with small, rigid aerodynamic surfaces forward and aft, with a first body-bending frequency of one cycle per second, and is to fly at very high dynamic pressure so that aeroelastic instabilities are severe. It is shown that, when the vehicle is unstable in divergence of the coupled pitching and first-bending modes, it can be stabilized with feedback control of the canard surfaces, but feedback control of the tail is generally destabilizing. Furthermore, control by means of one aerodynamic surface (single-actuator control) cannot stabilize the system when a dynamic instability exists in combination with the pitching static instability. Stability and achievable dynamic performance are highly dependent on the locations and areas of the aerodynamic surfaces and the location of the gyroscope. For canard control, the gyroscope must be located well forward, but somewhat aft of the nose.

17. NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

AD-449 379 **Field 17C**
CFSTI Price: $5.60
Electronic Defense Labs., Mountain View, Calif.
THE USE OF SOLAR RADIO EMISSION FOR ANTENNA ORIENTATION.
Technical memo.,
by Richard D. Bauman. 22 Jun 64, 52p EDL-M690
Contract DA-36-039-AMC-03404 (E)

Descriptors: (*Solar radiation, Tracking), (*Tracking, Solar radiation), (*Direction find ing signals, Solar radiation), (*Antennas, Direction finding), Sun, Extraterrestrial radio waves, Phased arrays, Antenna radiation patterns, Programming (Computers).

The sun is a readily available source of microwave radiation which can be detected by many tracking systems. Since the position of the sun is well known from optical measurements, the sun can be used as a beacon for antenna alignment. A technique for performing such an alignment is described and operating instructions for a computer program to provide analytic tracking angles for the sun are given. Techniques for increasing the accuracy of the alignment are discussed. The theory of the sun tracking program is presented and a listing of the program is provided. (Author)

N66-12975 **Field 17B, 22B**
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
EXPERIMENTAL/THEORETICAL EVALUATION OF A PASSIVE COMMUNICATIONS SATELLITE (ECHO II),
by A. Kampinsky and R. K. Ritt. Aug 65, 52p

NASA TM-X-56996
Prepared in cooperation with Conduction Corp., Ann Arbor, Mich. Prepared for presentation at U.R.S.I. Symp. on Electromagnetic Wave Theory, Delft, Netherlands, 1965.

Descriptors: (*Communication satellites (Passive), Radar reflections), Radar signals, Radar reflectors.

Identifiers: ECHO.

N66-13090 **Field 17B**
CFSTI Prices: HC$3.00 MF$0.50
ADCOM, Inc., Cambridge, Mass.
COMMAND SYSTEM STUDY FOR THE OPERATION AND CONTROL OF UNMANNED SCIENTIFIC SATELLITES. TASK III. COMMAND SYSTEM INTERFERENCE.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 65,
by P. A. Bello, A. M. Manders, and S. M. Sussman. 1965, 52p
Contract NAS5-9705
NASA CR-68414

Descriptors: (*Scientific satellites, Command and control systems).

N66-13091 **Field 17G**
CFSTI Prices: HC$5.00 MF$1.00
Western Development Labs., Philco Corp., Palo Alto, Calif.
INTERPLANETARY NAVIGATION AND GUIDANCE STUDY, VOLUME III. ILLUSTRATIONS AND TABLES.
30 Oct 65, 178p WDL-TR-2629, VOL. III
Contract NAS8-11198
NASA CR-68436

Descriptors: (*Spacecraft, Guidance), (*Navigation, Spacecraft), Tables.

Identifiers: Interplanetary guidance.

N66-13240 **Field 17G**
CFSTI Prices: HC$4.00 MF$0.75
McDonnell Aircraft Corp., St. Louis, Mo.
ORBITAL TESTING REQUIREMENTS FOR GUIDANCE AND CONTROL DEVICES.
Contractor rept.,
by F. Hercules and R. Butler. Dec 65, 99p
Contract NASw-1067
NASA CR-355

Descriptors: (*Space navigation, Control systems), (*Spacecraft, Guidance).

N66-14236 **Field 17H, 22B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
NASA/MOTS OPTICAL OBSERVATIONS OF THE ANNA 1 B SATELLITE,
by J. H. Berbert and D. W. Harris. Jan 66, 18p
NASA-TN-D-3174

Descriptors: (*Satellites (Artificial), Optical tracking), (*Optical tracking, Satellites (Artificial)), Photography, Beacons.

Identifiers: Anna, MOTS.

N66-14709 **Field 17G**
CFSTI Prices: HC$7.00 MF$2.00
McDonnell Aircraft Corp., St. Louis, Mo.
ORBITAL TESTING REQUIREMENTS FOR GUIDANCE AND CONTROL DEVICES. VOLUME II,
by R. Butler and F. Hercules. Dec 65, 396p
Contract NASw-1067
NASA CR-356

Descriptors: (*Guidance, Orbital trajectories), (*Control, Orbital trajectories).

PB-169 426 **Field 17B**
CFSTI Prices: HC$4.60 MF$0.50
Federal Communications Commission, Washington, D. C. Technical Research Div.
PROPAGATION DATA AND SERVICE CALCULATION PROCEDURES USED FOR THE RESCINDED APPENDIX 'A' OF REPORT AND ORDER (DOCKET 11532) RELEASED JUNE 26, 1956,
by Harry Fine and John M. Taff. 22 Oct 56, 42p
TRR-2.4.16

Descriptors: (*Propagation, Video signals), (*Video signals, Propagation), (*Radio waves, Propagation), Very high frequency, Ultrahigh frequency, Measurement, Television stations, Distribution, Radio interference, Television communication systems.

48. NUCLEAR SCIENCE AND TECHNOLOGY

AD-452 958 **Field 18J**
CFSTI Price: $4.60
Naval Radiological Defense Lab., San Francisco, Calif.
EXPERIMENTAL DETERMINATION OF THE GAMMARAY ANGULAR DOSE ALBEDOS OF CONCRETE, ALUMINUM AND STEEL,
by T. H. Jones, N. E. Scofield, L. G. Haggmark, andW. J. Gurney. 6 Oct 64, 46p USNRDL-TR-790
Proj. SF-011-05-11,
Task 0501, 11.038

Descriptors: (*Concrete, Gamma ray scattering), (*Steel, Gamma ray scattering), (*Aluminum, Gamma ray scattering), (*Reactor shielding mate rials, Gamma ray scattering), Albedo, Reactor shielding calculations, Cobalt, Cesium, Radioactive isotopes.

The angular distribution of dose albedo was measured for 'semi-infinite' concrete, aluminum and steel slabs irradiated by plane-parallel beams of Co (60) and Cs (137) gamma photons. The photons were incident on the slabs at angles, measured from a normal to the slab, of arccos 1.00, 0.75 and 0.50. For the necessary sensitivity, the reflected dose rate was measured by a digital dosimetry system using a plastic scintillator as the detector. An empirical formula for angular dose albedo was derived from the experimental data. Comparisons are made with the Monte Carlo calculations of D. J. Raso and the experimental results of C. E. Clifford.

AD464 309 **Field 18H, 9A**
CFSTI Price: HC$4.00
Boeing Co., Seattle, Washington.
A SURVEY OF TRANSIENT RADIATION-EFFECT STUDIES ON MICROELECTRONICS.
Final rept., Jan-Apr 65,
by W. C. Bowman, R. S. Caldwell and G. W. Svetich.
May 65, 124p
Contract AF 30 (602)-3585,
Proj. AF-5710
RADC TR-65-147

Descriptors: (*Radiation damage, Microminiaturi zation (Electronics)), (*Microminaturization (Electronics), Radiation damage), (*Abstracts, Radiation damage), Reports, Electronic equipment, Circuits.

In order to obtain complete up-to-date knowledge of the work accomplished and presently being done on the effects of transient nuclear radiation on microelectronics, a survey of the laboratories investigating this subject was conducted. Telephone contacts were made with specific individuals in 53 different laboratories. Data were obtained by means of questionnaires, reports, and personal visits. Abstracts of each document or other data source are included in the report. The abstracts describe the devices tested and the test environment, the type of dosimetry used, the general results obtained, and provide other relevant information. Summaries of failure levels are given in the abstracts whenever the information was readily available. A tabulated summary of the devices tested and the test conditions is presented. Failure levels observed by different investigators are compared for a few duplicated devices. Nine classified abstracts are contained in a supplement to the main report. (Author)

AGN-TM-411 **Field 18K, 9B**
CFSTI Prices: HC$4.00 MF$0.75
Aerojet-General Nucleonics, San Ramon, Calif.
ARMY GAS-COOLED REACTOR SYSTEMS PROGRAM. BOUNCE, AN IBM 7090 CODE TO CALCULATE FLUX DISTRIBUTIONS WITHIN MULTIPLE-PIN FUEL ELEMENTS BY THE METHOD OF SUCCESSIVE GENERATIONS,
by T. P. Wilcox. Nov 65, 106p
Contract AT (10-1)-880

Descriptors: (*Neutron flux, Programming (Computers)), (*Reactor fuel elements, Neutron flux).

Identifiers: Bounce.

ANL-7033 **Field 18K, 9B**
CFSTI Prices: HC$3.00 MF$0.75
Argonne National Lab., Ill.
RIFF RAFF. A PROGRAM FOR COMPUTATION OF RESONANCE INTEGRALS IN A TWO-REGION CELL,
by P. H. Kier. Aug 65, 66p
Contract W-31-109-eng-38

Descriptors: (*Resonance absorption, Computers), (*Programming languages, Resonance absorption).

Identifiers: Riff Raff.

APDA-166 **Field 18J, 7B**
CFSTI Prices: HC$2.00 MF$0.50
Atomic Power Development Associates, Inc., Detroit, Mich.
DETERMINATION OF CARBONATE CARBON IN SODIUM METAL,
by D. F. Boltz and S. A. Meacham. 15 Jan 65, 34p
Contract AT (11-1)-865

Descriptors: (*Carbonates, Impurities), (*Sodium, Liquid metal coolants).

BNWL-113-10 Vol. 5 No. 10 **Field 18J, 7B, 7C, 11F**
CFSTI Prices: HC$3.00 MF$0.75
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
PLUTONIUM ABSTRACTS. VOLUME 5. NUMBER 10.
30 Nov 65, 59p
Contract AT (45-1)-1830

Descriptors: (*Plutonium, Nuclear physics), (*Abstracts, Plutonium).

BNWL-113-11 **Field 18J, 7B, 7C, 11F**
CFSTI Prices: HC$2.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
PLUTONIUM ABSTRACTS. VOLUME 5. NUMBER 11.
31 Dec 65, 34p
Contract AT (45-1)-1830

Descriptors: (*Plutonium, Nuclear physics), (*Abstracts, Plutonium).

BNWL-34 **Field 18J, 20D**
CFSTI Prices: HC$2.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
THE LOW-PRESSURE CRITICAL DISCHARGE OF STEAM - WATER MIXTURES FROM PIPE ELBOWS AND TEES,
by F. R. Zaloudek. Mar 65, 27p
Contract AT (45-1)-1350

Descriptors: (*Two-phase flow, Pipe fittings), (*Reactor coolants, Two-phase flow).

CNLM-5977 **Field 18D, 18H**
CFSTI Prices: HC$1.00 MF$0.50
Pratt and Whitney Aircraft, Middletown, Conn. Aircraft Nuclear Engine Lab.
CONTAINMENT VESSEL LEAK RATE CRITERIA FOR A PROPOSED CANEL NUCLEAR TEST FACILITY,
by E. V. Sandin. 2 Dec 64, 20p
Contract AT (30-1)2789

Descriptors: (*Containment, Nonleakage probability), (*Radioactivity, Site selection).

COO-1402-1 **Field 18J**
CFSTI Prices: HC$3.00 MF$0.75
Franklin Inst., Philadelphia, Pa. Labs. for Research and Development.
CRITICAL REVIEW OF THE DESIGN OF THE HALLAM MODERATOR ELEMENT, PHASE I,
by K. R. Stearns, and Zenons Zudans. 28 Aug 64, 66p I-B2254-1
Contract AT (11-1)-1402

Descriptors: (*Reactor moderators, Design).

COO-1402-2 **Field 18J**
CFSTI Prices: HC$3.00 MF$0.75
Franklin Inst., Philadelphia, Pa. Labs. for Research and Development.
CRITICAL REVIEW OF THE DESIGN OF THE HALLAM MODERATOR ELEMENT, PHASE II. TASK 1. THE CONCENTRATION OF STRESS IN THE CAN AT A JOINT IN GRAPHITE CAUSED BY TEMPERATURE GRADIENTS ACROSS A DIAMETER OF THE MODERATOR ELEMENT. TASK 2. POSSIBILITY OF MECHANISM OF THERMAL STRESS RATCHET,
by K. R. Stearns and L. Berkowitz. 14 Dec 64, 60p F-B2254
Contract AT (11-1)-1402

Descriptors: (*Reactor modulators, Thermal stresses), (*Reactor materials, Mechanical properties).

COO-652-9 **Field 18L, 18E**
CFSTI Prices: HC$1.00 MF$0.50
Piqua Nuclear Power Facility, Ohio.
PIQUA NUCLEAR POWER FACILITY MONTHLY OPERATING REPORT NO. 19.
Nov 64, 25p
Contract AT (11-1)-652

Descriptors: (*Power reactors, Reactor oper-

ation), (*Nuclear power plants, Reactor operation).

DP-958 **Field 18K, 18I**
CFSTI Prices: HC$6.00 MF$1.25
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
XENON AND SAMARIUM TABLES,
by Barbara B. Occhipinti. Jul 65, 222p
Contract AT (07-2)-1

Descriptors: (*Xenon, Reactor poisons), (*Samarium, Reactor poisons), St. Tabbs, Data.

EURAEC-1163 **Field 18I**
CFSTI Prices: HC$2.00 MF$0.50
Institutt for Atomenergi, Lillestrom (Norway) Halden Reaktor Prosjekt.
SEVEN-ROD BUNDLE NATURAL CIRCULATION STABILITY AND BURN-OUT TESTS WITH WATER AT UP TO 30 ATMOSPHERES PRESSURE.
Special Technical Rept. no. 15,
by R. W. Bowring and C. L. Spigt. Jul 64, 40p

Descriptors: (*Heat exchangers, Burnthrough), (*Nuclear engineering, Heat transfer).

Identifiers: Burnout.

EURAEC-1224 **Field 18I**
CFSTI Prices: HC$1.00 MF$0.50
Maschinenfabrik Augsburg-Nurnberg A. G., Nuremberg.
INVESTIGATION OF BURNOUT IN THE CASE OF BOILING WATER.
Quarterly rept no. 12, 1 Jul - 30 Sep 64,
by H. H. Agena and D. Henkel. Oct 64, 18p
Contract 057-61-RDD,
Proj. 22
EURAEC 1224

Descriptors: (*Boiling water reactors, Heat transfer), (*Heat exchangers, Burnthrough).

Identifiers: Burnout.

EURAEC-1230 **Field 18L, 18I**
CFSTI Prices: HC$2.00 MF$0.50
Commissariat A Lenergie Atomique, Saclay (France). Centre Detudes Nucleaires.
HYDRODYNAMIC INSTABILITY LIMITING THE POWER OF BOILING WATER REACTORS.
Quarterly rept. no. 1, 1 Jan - 31 Mar 64.
31 Mar 64, 38p
Contract 006-64-1

Descriptors: (*Boiling water reactors, Stability), (*Hydrodynamics, Boiling water reactors).

EURAEC-1249 **Field 18J, 18H, 11F**
CFSTI Prices: HC$3.00 MF$0.75
Metallgesellschaft A. G., Frankfurt AM Main (West Germany).
STUDIES ON THE INFLUENCE OF NEUTRON IRRADIATION ON THE PROPERTIES OF ZRNB3SN1.
Final rept.,
by W. Jung-Koenig, H. Richter, and W. Spalthoff.
14 Oct 64, 75p
Contract 092-62-7 RDD

Descriptors: (*Reactor materials, Zirconium alloys), (*Zirconium alloys, Radiation damage), Neutrons.

HASL-166 **Field 18H, 6R**
CFSTI Prices: HC$2.50 MF$0.75
Health and Safety Lab., New York Operations Office (AEC), N. Y.
14 C MEASUREMENTS IN THE ATMOSPHERE.
1 Jan 66, 73p

Descriptors: (*Radioactive isotopes, Carbon), (*At mospheric sounding, Radioactive isotopes).

LA-3406 **Field 18K, 18I**
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
SPECTRAL INDICES OF A 4.29 PER CENT 235 U -ENRICHED URANIUM METAL EXPONENTIAL COLUMN,
by R. G. Steinke. 3 Sep 65, 21p
Contract W-7405-eng-36

Descriptors: (*Enriched fuel reactors, Uranium), (*Uranium, Critical assemblies).

MLM-1315 **Field 18F, 18H**
CFSTI Prices: HC$1.00 MF$0.50
Mound Lab., Miamisburg, Ohio.
GAMMA SHIELDING REQUIREMENTS FOR 238 PU AND 210 PO (REVISED),
by K. W. Foster. 21 Jan 66, 10p
Contract AT-33-1-GEN-53

Descriptors: (*Reactor shielding materials, Gamma rays), (*Radioactive isotopes, Shielding), Plutonium, Polonium.

N66-13099 **Field 18J**
CFSTI Prices: HC$1.00 MF$0.50
United Aircraft Corp., East Hartford, Conn. Research Labs.
THERMODYNAMIC PROPERTIES OF COOLANT FLUIDS AND PARTICLE SEEDS FOR GASEOUS NUCLEAR ROCKETS,
by R. Roback. Sep 64, 25p C-910092-3
Contract NASw-847
NASA CR-68392

Descriptors: (*Coolants, Thermodynamics), (*Chemical equilibrium, Coolants).

Identifiers: Radiative heat transfer.

N66-13563 **Field 18F, 4A, 20I, 22B**
CFSTI Prices: HC$2.00 MF$0.50
Brown Engineering Co., Inc., Huntsville, Ala. Research Labs.
AN ANNOTATED BIBLIOGRAPHY ON MOTION OF CHARGED PARTICLES IN MAGNETIC FIELDS AND MAGNETIC SHIELDING AGAINST SPACE RADIATION,
by P. F. McDonald. Nov 65, 44p R-161
Contract NAS8-20166
NASA CR-68657

Descriptors: (*Shielding, Space environmental con ditions), (*Magnetic fields, Shielfing), Charged particles, Motion, Bibliographies.

N66-14705 **Field 18J**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
RADIANT HEATING OF A SEEDED GAS IN A COAXIAL-FLOW GASEOUS REACTOR,
by C. C. Masser. Jan 66, 29p NASA-TN-D-3197

Descriptors: (*Propellants, Heating), (*Hydrogen, Heating).

Identifiers: Radiative heat transfer, Seeding.

NAA-SR-11160 **Field 18I, 18L, 18J**
CFSTI Prices: HC$2.00 MF$0.50
Atomics International, Canoga Park, Calif.
SRE-PEP MODERATOR ELEMENTS.
Final rept.,
by C. E. Jones. 15 Jan 66, 49p
Contract AT (11-1)-GEN-8

Descriptors: (*Sodium graphite reactors, Reactor moderators), (*Reactor moderators, Nuclear engineering).

NAA-SR-11586 **Field 18I, 18J, 20D, 20M**
CFSTI Prices: HC$3.00 MF$0.50
Atomics International, Canoga Park, Calif.
STEADY-STATE SODIUM BOILING AND HYDRODYNAMICS,
by H. Lurie. 15 Jan 66, 49p
Contract AT (11-1)-GEN-8

Descriptors: (*Sodium, Liquid metal coolants), (*Reactor safety systems, Sodium), Boiling, Fluid mechanics, Liquid metal cooled reactors.

NAA-SR-11642 **Field 18I, 18N, 18H, 22B**
CFSTI Prices: HC$1.00 MF$0.50
Atomics International, Canoga Park, Calif.
THE PREDICTED FISSION PRODUCT DECAY OF SNAPSHOT I,
by W. B. Sayer and R. S. Hart. 15 Jan 66, 17p

Contract AT (11-1)-GEN-8

Descriptors: (*Fission products, Nuclear power plants), (*Auxiliary power plants, Spacecraft).

Identifiers: Snapshot I.

ORNL-TM-1066 **Field 18D, 18K**
CFSTI Prices: HC$4.00 MF$0.75
Oak Ridge National Lab., Tenn.
MEASUREMENT OF REACTOR FLUCTUATION SPECTRA AND SUBCRITICAL REACTIVITY.
Doctoral thesis,
by C. W. Ricker, S. H. Hanauer, and E. R. Mann.
Apr 65, 105p
Contract W-7405-eng-26

Descriptors: (*Reactor operation, Performance (Engineering)), (*Nuclear reactors, Reactor kinetics).

RFP-637 **Field 18D**
CFSTI Prices: HC$1.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
A LARGE-AREA GAS PROPORTIONAL DETECTOR FOR LOW-ENERGY PHOTONS,
by W. H. Tyree. 6 Jan 66, 16p
Contract AT (29-1)-1106

Descriptors: (*Photons, Proportional counters), (*Crystal counters, Photons).

RFP-649 **Field 18D, 9A**
CFSTI Prices: HC$1.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
A STUDY OF THERMISTOR STABILITY,
by C. A. Pippin. 14 Dec 65, 9p
Contract AT (29-1)-1106

Descriptors: (*Thermistors, Stability), (*Crystal ovens, Thermistors).

SLAC-52 **Field 18D, 20G**
CFSTI Prices: HC$3.00 MF$0.75
Stanford Linear Accelerator Center, Stanford Univ., Calif.
A SUBNANOSECOND COINCIDENCE CIRCUIT,
by Arpad Barna. Nov 65, 63p SLAC-52
AT (04-3)-515

Descriptors: (*Electron beams, Radiofrequency power), (*Coincidence counting, Particle accelerators).

Identifiers: Subnanosecond.

TID-21521 **Field 18H, 8A**
CFSTI Prices: HC$2.00 MF$0.50
Parma Univ. (Italy). Istituto di Zoologia e Anatomia Comparate.
ECOLOGY OF ACANTHERIA IN RELATION TO THE SR CIRCULATION IN THE SEA.
Progress rept, 23 Jul 64 - 23 Jan 65,
by Bruno Schreiber. 23 Jan 65, 42p
Contract IAEA 62/REN.3/US

Descriptors: (*Plankton, Strontium), (*Strontium, Radioactive isotopes), Sea water.

Identifiers: Acantharia.

TID-22330 **Field 18L, 7A, 13B**
CFSTI Prices: HC$4.00 MF$2.75
Bechtel Corp., San Francisco, Calif.
ENGINEERING AND ECONOMIC FEASIBILITY STUDY FOR A COMBINATION NUCLEAR POWER AND DESALTING PLANT. PHASE III.
Dec 65, 590p

Descriptors: (*Power reactors, Feasibility studies), (*Desalination, Nuclear industrial applications).

TID-3043 (Rev. 2, Suppl. 3) **Field 18I, 18B, 6R**
CFSTI Prices: HC$2.00 MF$0.75
Division of Technical Information Extension (AEC), Oak Ridge, Tenn.
BIBLIOGRAPHIES OF INTEREST TO THE ATOMIC ENERGY PROGRAM,
by Richard J. Smith, Hugh E. Voress, andNaomi R. Smelcer. May 65, 84p

Descriptors: (*Nuclear energy, Documentation), (*Bibliographies, Nuclear energy).

TID-5360 **Field 18H, 6R**
CFSTI Prices: HC$3.00 MF$0.50
Division of Operational Safety (AEC), Washington, D. C. Industrial Safety and Fire Protection Branch.
A SUMMARY OF INDUSTRIAL ACCIDENTS IN USAEC FACILITIES, 1963-1964.
Dec 65, 49p

Descriptors: (*Reactor accidents, Radiation injuries), (*Radiation hazards, Reactor accidents).

TID-8541 **Field 18I, 18J, 18K, 18L**
CFSTI Prices: HC$4.50 MF$2.00
Argonne National Lab., Ill.
REACTOR TECHNOLOGY. SELECTED REVIEWS- 1965,
by Leonard E. Link. Jan 66, 445p
Contract W-31-109-eng-38

Descriptors: (*Nuclear reactors, Reviews), (*Reactor operation, Reviews), Reactor materials, Reactor kinetics, Radioactive waste.

UCRL-13138 **Field 18I**
CFSTI Prices: HC$2.00 MF$0.50
Baldwin-Lima-Hamilton Corp., Eddystone, Pa. Industrial Equipment Div.
INSTRUCTION MANUAL FOR PROMPT BURST CRITICAL ASSY MACHINE, SUPER KUKLA.
1964, 40p
Contract W-7405-eng-48

Descriptors: (*Critical assemblies, Instruction manuals), (*Reactor system components, Critical assemblies).

Identifiers: Super Kukla.

UCRL-14294 **Field 18C, 8I**
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
THE PARTICLE SIZE DISTRIBUTION AND BULK PERMEABILITY OF OIL SHALE RUBBLE,
by D. B. Lombard. 12 Aug 65, 12p
Contract W-7405-eng-48

Descriptors: (*Shale, Fragmentation), (*Particle size, Shale), Nuclear industrial applications, Nuclear explosions, Underground explosions.

UCRL-16434 **Field 18B, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Berkeley.
HIGH-TEMPERATURE COMPRESSIVE DEFORMATION EQUIPMENT,
by C. O. Hulse and S. M. Copley. 27 Oct 65, 18p

Contract W-7405-eng-48

Descriptors: (*Ceramic materials, Deformation), (*Test equipment, Ceramic materials), Compressive properties, High temperature research.

UCRL-16471 **Field 18D, 9B**
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Berkeley.
ISO - A FORTRAN PROGRAM FOR UTILIZING THE STRONG-FOCUSING PRINCIPLE IN BETA-RAY SPECTROMETER DESIGN,
by Herman Owens. 21 Oct 65, 9p
Contract W-7405-eng-48

Descriptors: (*Nuclear radiation spectrometers, Focusing), (*Programming languages, Nuclear radiation spectrometers).

YAEC-124 **Field 18L, 18J**
CFSTI Prices: HC$3.00 MF$0.75
Westinghouse Electric Corp., Pittsburgh, Pa. Atomic Power Dept.
YAEC DEVELOPMENT PROGRAM FOR THE PERIOD JULY 1 TO DECEMBER 31, 1959,
by H. E. Walchli. Jul 59, 54p
Contract AT (30-3)-222

Descriptors: (*Power reactors, Reactor fuels), (*Reactor fuels, Reactor fuel cladding).

19. ORDNANCE

AD-464 534 **Field 19A, 13H**
CFSTI Price: HC$4.00
Naval Propellant Plant, Indian Head, Md.
INDUSTRIAL PREPAREDNESS MEASURE: STUDY OF IMPROVED METHODS OF DRYING CASTING POWDER.
Final rept.,
by Joseph E. Geist. 25 Mar 65, 141p

Descriptors: (*Solid propellants, Drying), (*Explosive materials, Drying), Industrial production, Casting, Powders, Industrial equip ment, Handling, Heating, Safety.

Four methods of drying casting powder were studied, namely, 'sweetie' barrel, bed drying, Roto-louvre, and dielectric. Of the methods studied, the dielectric drying offers the most advantages in regard to safety, adaptability to remote and continuous processing, drying time, and operating cost. Estimated annual savings of $178,260 may be obtained by using dielectric drying in place of the present dryhouse method. (Author)

AD-469 632 **Field 19D**
CFSTI Prices: HC$1.00 MF$0.50
Rohm and Haas Co., Huntsville, Ala. Redstone Arsenal Research Div.
A MICROWAVE TECHNIQUE FOR STUDYING DETONATION PHENOMENA,
by Edgar G. Johnson. 13 Sep 65, 25p Special rept. SR-S-87
Contract DA-01-021-ORD-11909 (Z)

Descriptors: (*Detonations, Shock waves), (*Shock waves, Probes (Electromagnetic)), (*Microwave equipment, Detonations), Microwave oscillators, Waveguides, Interferometers, Explosive materials, Charges (Explosive), Dielectrics, Microwave spectros copy, Pentolite, RDX, Ammonium compounds, Perchlorates.

Identifiers: Composition C-4 (Explosive), Ammonium perchlorate.

A microwave technique was developed for studying shock phenomena in condensed phases. The microwave energy reflected by the shock front was used to determine velocities of both reactive (detonation) and non-reactive shocks. This technique used standard microwave components and an expendable, dielectric rod waveguide as a transmission line to the sample under study. The oscillogram of the output of a crystal detector is a continuous displacement-time trace of the shock front as it moves through the sample. The trace can be interpreted in terms of microwave interferometry, in that the detected signal goes through a maximum and a minimum for each displacement of the shock front by a half wavelength, or as the Doppler shift in frequency produced by the velocity of the approaching shock front. This technique has been applied to the problem of determining the growth to detonation near the 50% card gap value of 1-inch diameter charges of Composition C-4 explosive and of 2-inch diameter charges of NH4Cl04 confined in glass. Simultaneous microwave and streak-camera measurements of the detonation of 2-inch diameter charges of pentolite were made. (Author)

AD-475 887 **Field 19H, 13J**
CFSTI Prices: HC$4.00 MF$1.00
Grumman Aircraft Engineering Corp., Bethpage, N. Y. Research Dept.
EXPERIMENTS WITH A STEAM-TO-WATER PSEUDO-BLADE PROPULSOR FOR MARINE APPLICATION. PART I, TECHNICAL DISCUSSION,
by G. Avellone and C. A. Sarro. Dec 65, 133p RE-235-Pt-1
Contract NOw-64-0606-f

Descriptors: (*Marine propulsion, Liquid jets), (*Underwater propulsion, Torpedoes), (*Torpedoes, Underwater propulsion), Torpedo propellants, Fluid flow, Thrust, Steam, Water, Energy Conversion, Hydraulic systems.

An experimental model of a device suitable for propelling torpedoes was tested in a water tunnel over a speed range of 0 to 30 fps. This device, called the pseudo-blade propulsor, is based on the concept of direct energy transfer between two fluids utilizing moving pressure fields. The model used steam as the primary, high energy fluid and water as the secondary or low energy fluid. The

test results prove that the concept is sound and shows promise for application as a propulsor for torpedoes and other water borne vehicles. Two illustrations of the basic concept are included in the report to demonstrate the mechanism involved in the transfer of energy. (Author)

AD-475 888 **Field 19H, 13J**
CFSTI Prices: HC$3.00 MF$0.75
Grumman Aircraft Engineering Corp., Bethpage, N. Y. Research Dept.
EXPERIMENTS WITH A STEAM-TO-WATER PSEUDO-BLADE PROPULSOR FOR MARINE APPLICATION. PART II, APPENDIX,
by G. Avellone and C. A. Sarro. Dec 65, 53p
RE-235-Pt-2
Contract NOw-64-0606-f
See also AD-475 887.

Descriptors: (*Marine propulsion, Liquid jets), (*Underwater propulsion, Torpedoes), (*Torpedoes, Underwater propulsion), Torpedo propellants, Fluid flow, Thrust, Steam, Water, Energy conversion, Hydraulic systems, Tables, Tests.

The volume contains tables of data recorded during testing of the pseudo-blade propulsor. Two tables are provided: Table I contains the quantities measured and calculated from the bulk of the tests; Table II contains the data associated with the series of tests conducted at constant tunnel static pressure for simulated depth operation. (Author)

20. PHYSICS

AD-403 330 **Field 20E**
CFSTI Price: HC$2.60
Perkin-Elmer Corp., Norwalk, Conn.
RUBY IMPROVEMENT FOR LASERS, TASK II.
Quarterly rept. no. 3, 31 Oct 62-31 Jan 63,
by G. W. Dueker. 28 Feb 63, 28p PE-TR-M7314
Contract DA-36-039-sc-89091,
Proj. DA-3A-99-21-001-05
See also AD-297 073.

Descriptors: (*Lasers, Ruby), Crystals, Production, Fluorescence, Measurement.

A report is given on the optical evaluation of lots three and four of ruby crystals grown. The technique of fluorescence line width measurement is discussed. (Author)

AD-453 855 **Field 20L, 20F**
CFSTI Price: $4.60
Honeywell Research Center, Hopkins, Minn.
THIN FILM IMAGE CONVERTER.
Interim technical progress rept. no. 6, 24 Jul-23 Oct 64,
by Paul W. Kruse, Fred C. Pribble, and Richard G. Schulze. 20 Nov 64, 50p
Contract DA-44-009-AMC-168 (T),
Proj. DA-8F23-11-001-07
N65 14977

Descriptors: (*Semiconducting films, Infrared images), (*Infrared images, Semiconducting films), Epitaxial growth, Gallium alloys, Arsenic alloys, Germanium, Single crystals, Phosphorus alloys, Electrical properties, Chemical milling.

Identifiers: Image converters.

Investigations of the epitaxial growth of n-GaAs on p-Ge have made it possible to prepare 200 microns thick layers of single crystal GaAs on Ge. An evaluation of the electrical properties of samples etched to a mesa configuration, together with che ..ical staining studies of angle lapped samples, reveal that an n-Ge layer is formed between the n-GaAs and p-Ge regions during the initial stages of growth. The most probable donor is As, diffused from the vapor into the Ge. Methods for preparing strong, ohmic, low resistance contacts to n-GaAs, n-GaP, and p-GaP have been devised utilizing ultrasonic soldering. The best techniques are summarized. (Author)

AD-463 254 **Field 20H, 9B**
CFSTI Price: HC$3.60
Naval Radiological Defense Lab., San Francisco, Calif.
A COMPUTER PROGRAM FOR UNFOLDING PULSE-HEIGHT DISTRIBUTIONS,
by Charles V. Smith and Norman E. Scofield. 5 Mar 65, 40p USNRDL-TR-829
Proj. SF 011-05-11,
Task 050118

Descriptors: (*Gamma-ray spectra, Programming (Computers), Photons, Nuclear radiation spectrometers, Gramma-ray spectroscopy, Scintillation counters, Pulse height analyzers, Distribution, Least square methods, Magnetic core storage, Computer storage devices, Mathematical programming, Iterative methods, Vector analysis, Digital computers, Gamma rays.

Identifiers: Fortran II, IBM-704.

The pulse-height distribution obtained from a scintillation spectrometer is an instrumental distortion of the gamma-ray spectrum for which it is a measure. By calibrating the detector with ratioactive sources of known strength and gamma energy, a representation of this distortion may be embodied in a detector response matrix. A series of computer programs are presented which aid in forming this matrix and in using it to effect a mathematical transformation from the measured pulse-height distribution to the desired gamma-ray spectrum.

AD-463 919 **Field 20H**
CFSTI Price: HC$1.60
Naval Radiological Defense Lab., San Francisco, Calif.
STRUCTURE IN THE Al27 (n, ALPHA) CROSS SECTION.
by James M. Ferguson. 6 May 65, 12p
USNRDL-TR-846
Proj. SR-011-01-01,
Task 0401
N65 30502

Descriptors: (*Nuclear cross sections, Measurement), (*Aluminum, Nuclear cross sections), Neutrons, Measurement, Neutron reactions, Alpha cross sections, Neutron cross sections.

The excitation function for the Al-27 (n,alpha) cross section was measured from 12.8 to 14.3 Mev. The energy resolution of the data is better than 80 kev, and the statistical errors are less than 1 percent. The data show a peak at 13.55 Mev in the cross section with a width of about 300 kev and an amplitude of about 4% of the average cross section in this region. (Author)

AD-466 027 **Field 20E, 20F**
CFSTI Prices: HC$1.00 MF$0.50
Spectrolab., Sylmar, Calif.
DESIGN AND FABRICATION OF OPTICAL FILTERS FOR SELECTED LASER FREQUENCIES.
Interim technical rept., 1 Mar-31 May 65,
by Samuel J. Holmes. 15 Jun 65, 15p
Contract AF33 (615)-2402

Descriptors: (*Lasers, Optical filters), (*Optical filters, Lasers), Helium, Neon, Line spectrum, Bandwidth, Design, Construction, Tests, Zinc compounds, Sulfides, Mica, Calibration, Sensitivity.

Identifiers: Zinc sulfides.

A report is given of the design, fabrication, and evaluation of a helium-neon laser optical filter. The filter is centered at 6328A with a half-power bandwidth of about 1.5A and a peak transmission of about 45%.

AD-466 667 **Field 20L, 7D, 20C, 20M**
CFSTI Prices: HC$3.00 MF$0.75
Carnegie Inst. of Tech., Pittsburgh, Pa. Dept. of Physics.
THE MAGNETIC AND THERMAL PROPERTIES OF (Cr3 (CH3C00)-6 (0H)2)C1.8H20. A SYSTEM OF CLUSTERS OF THREE Cr- (+++) IONS,
by Norikiyo Uryu and Simeon A. Friedberg. 1 Jul 65, 68p Technical rept. no. TR-1
Contract Nonr-760 (26),
Proj. NR-018-301

Descriptors: (*Chromium compounds, Physical properties), (*Acetates, Physical properties), (*Complex compounds, Acetates), Hydroxides, Chlorides, Hydrates, Salts, Magnetic properties, Thermal properties, Ions, Specific heat, Crystal structure, Hamiltonian, Atomic energy levels, Nuclear spins.

Identifiers: Dihydroxy hexakis (acetate) trichromium chloride.

The paramagnetic susceptibility and magnetic specific heat of the complex salt (Cr3 (CH3C00)6 (OH)2) C1.8H20 are examined theoretically in the light of recently obtained knowledge of its crystal structure. Each unit cell contains four isolated triangular clusters of three Cr +++ ions. The structural evidence neither confirms nor excludes clearly the long-conjectured possibility that a cluster have less than trigonal symmetry. In an attempt to construct possible alternatives to Kambe's theory which requires cluster distortion, the energy levels of a cluster were calculated assuming equal isotropic exchange interaction. In order to split the two Kramers doublets comprising the ground state as required by experiment and retain the cluster symmetry a higher order spin interaction is required. Fitting the low temperature specific heat and susceptibility one finds Jo = 30k and J' = 0.9k, with a slightly smaller value of J' required to fit the susceptibility at higher temperatures. The plausibility of such a novel interaction is considered as is the ordered spin arrangement within a cluster at low temperatures. (Author)

AD-468 295 **Field 20C, 20B, 20L, 7D**
CFSTI Prices: HC$1.00 MF$0.50
Carnegie Inst. of Tech., Pittsburgh, Pa. Dept. of Physics.
LOW TEMPERATURE MAGNETIC SUSCEPTIBILITY OF FERROUS OXALATE DIHYDRATE,
by S. de S. Barros and S. A. Friedberg. 28 Jul 65, 19p Technical rept. TR-2
Contract Nonr-760 (26),
Proj. NR-018-301

Descriptors: (*Iron compounds, Magnetic properties), (*Oxalates, Magnetic properties), Low-temperature research, Absorption spectrum, Crystal structure, Antiferromagnetism, Nuclear spins, Powders.

Identifiers: Ferrous oxalate, Magnetic susceptibility.

The magnetic susceptibility of powdered Fe (COO)2.2H2O was measured between 1.3K and 300K. Above approx. 80K, Xp = 3.33/ (T ;25.4) (cgs/mole). Xp exhibits a broad rounded maximum near 30K and a sharp peak at 20 K. X-ray structural evidence indicates that Fe (++) ions in this material are linked in chains by oxalate groups. Assuming an antiferromagnetic intrachain exchange constant J = -4.9k, it is possible to obtain a reasonable fit of the data above 25K with the susceptibility computed for Ising interactions and S = 2. If the upper maximum is due to chain ordering, the lower maximum would then appear to be associated with the cooperative onset of long range spin order in three dimensions induced by interchain coupling. (Author)

ANL-7118 **Field 20G, 20H**
CFSTI Prices: HC$4.00 MF$0.75

Argonne National Lab., Ill.
SURVEY OF POLARIZED ION SOURCES IN EUROPE,
by D. C. Hess and D. von Ehrenstein. Nov 65, 103p
Contract W-31-109-eng-38

Descriptors: (*Ion sources, Polarization), (*Cyclo trons, Europe).

N66-12152 **Field 20D, 1C**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
INTERFERENCE HEATING ON A SWEPT CYLINDER IN REGION OF INTERSECTION WITH A WEDGE AT MACH NUMBER 8.
Technical note,
by Dennis M. Bushnell. Dec 65, 48p NASA-TN-D-3094

Descriptors: (*Swept wings, Heat transfer), (*Boundary layer transition, Aerodynamic configurations), Reynolds number, Cylindrical bodies, Wedges.

N66-12156 **Field 20D**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
EFFECTS OF A MOMENTUM BUFFER REGION ON THE COAXIAL FLOW OF DISSIMILAR GASES.
Technical note,
by Robert G. Ragsdale. Dec 65, 25p NASA-TN-D-3138

Descriptors: (*Flow fields, Boundary layer), (*Boundary layer, Jet mixing flow), Laminar flow, Turbulence, Gas flow.

Identifiers: Buffer region.

N66-12161 **Field 20K**
CFSTI Prices: HC$3.00 MF$0.50
Measurement Analysis Corp., Los Angeles, Calif.
THE MAXIMUM RESPONSE OF A LINEAR MECHANICAL OSCILLATOR TO STATIONARY AND NONSTATIONARY RANDOM EXCITATION.
Contractor rept.,
by R. L. Barnoski. Dec 65, 48p
Contract NAS5-4590
NASA CR-340

Descriptors: (*Oscillation, Loading (Mechanics)), Vibrators (Mechanical).

N66-12253 **Field 20M**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
CREEPING FLOW SOLUTION OF THE LEIDENFROST PHENOMENON.
Technical note,
by Kenneth J. Baumeister and Thomas D. Hamill. Dec 65, 25p NASA-TN-D-3133

Descriptors: (*Drops, Heat transfer coefficients), (*Evaporation, Drops), Liquids.

Identifiers: Leidenfrost.

N66-12853 **Field 20L, 20C, 20B**
CFSTI Prices: HC$2.00 MF$0.50
Field Emission Corp., McMinnville, Oreg.
INVESTIGATION OF ELECTRON EMISSION CHARACTERISTICS OF LOW WORK FUNCTION SURFACES.
Quarterly progress rept. no. 3, 1 Apr-30 Jun 65, by L. C. Crouser and L. W. Swanson. 25 Aug 65, 44p
Contract NASw-1082
NASA CR-68187

Descriptors: (*Field emission, -Tungsten), (*Tungsten, Field emission), Work functions, Crystallography.

N66-12861 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Alabama Univ., Huntsville. Research Inst.
HYPERSONIC FLOW OF AIR PAST A CIRCULAR CYLINDER WITH NON-EQUILIBRIUM OXYGEN DISSOCIATION INCLUDING DISSOCIATION OF THE FREE STREAM,
by R. Hermann and J. Thoenes. Sep 65, 42p
UARI-RR-28
Grant NsG-381
NASA CR-68238
Prepared for Presentation at European Aeron Corp. (6th), Munich 1-4 Sep 65.

Descriptors: (*Hypersonic flow, Cylindrica' bodies), (*Oxygen, Dissociation), Nonequilibrium flow, Aerodynamic characteristics.

N66-12862 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
Alabama Univ., Huntsville. Research Inst.
ADIABATIC EXCHANGE APPROXIMATION IN ELECTRON SCATTERING FROM MULTI-ELECTRON ATOMS,
by W. R. Garrett. Sep 65, 44p VARI-19
Grant NsG-381
NASA CR-68239

Descriptors: (*Electrons, Scattering), Lithium, Sodium, Approximation (Mathematics).

N66-12968 **Field 20F, 13H, 11F**
CFSTI Prices: HC$3.00 MF$0.50
Bausch and Lomb, Inc., Rochester, N. Y. Grating Research Section.
GRATING GROOVE FORMATION IN AU AND AU- GE ALLOYS. SURFACE POLISH EFFECTS ON AU MIRRORS.
Final rept., 1 Apr - 30 Sep 65,
by C. F. Mooney. 25 Sep 65, 56p
Contracts NASA Order R-107, Nonr-4277/00/ /X/
NASA CR-68310

Descriptors: (*Mirrors, Surfaces), (*Gold alloys, Mirrors), Surface properties, Finishes - Finishing, Electron microscopy, Reflectometers, Ultraviolet radiation, Germanium alloys, Gold.

N66-12978 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
William and Mary Coll., Williamsburg, Va.
MUON CAPTURE RATES IN COMPLEX NUCLEI,
by M. Eckhause, T. A. Filippas, R. T. Siegel, andR. E. Welsh. 1965, 20p
Grant NsG-567
NASA CR-68361
Prepared in cooperation with Carnegie Inst. of Tech., Pittsburgh.

Descriptors: (*Muons, Nuclear reactions), (*Nuclei, Meson capture).

N66-13011 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Enrico Fermi Inst. for Nuclear Studies, Univ. of Chicago, Ill.
ACCELERATION OF PARTICLES IN THE EARTH'S SHOCK TRANSITION REGION AND BEYOND,
by C. Y. Fan, G. Gloeckler, and J. A. Simpson. 1965, 16p EFINS-65-86
Contracts NAS5-2990, NAS5-2133
NASA CR-68295
Prepared in cooperation with Air Force contract AF 19 (628)-2473.

Descriptors: (*Particles, Acceleration), (*Electron transitions, Particles), Earth, Electrons.

Identifiers: Bow shock.

N66-13012 **Field 20H**
CFSTI Prices: HC$3.00 MF$0.50
Rensselaer Polytechnic Inst., Troy, N. Y.
SCATTERING BY NONSPHERICAL SYSTEMS,
by J. M. Greenberg, L. F. Libelo, A. C. Lind, andRu. T. Wang. 1965, 54p
NASA CR-68293

Descriptors: (*Microwaves, Scattering).

N66-13019 **Field 20M, 21C, 18N, 13A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
TWO-DIMENSIONAL HEAT TRANSFER IN RADIATING STAINLESS-STEEL-CLAD COPPER FINS.
Technical note,
by Norbert O. Stockman and Edward C. Bittner. Dec 65, 24p NASA-TN-D-3102

Descriptors: (*Fins, Heat transfer), (*Heat transfer, Fins), Stainless steel, Cooper, Cladding.

N66-13079 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Brown Engineering Co., Inc., Huntsville, Ala. Research Labs.
ANALYSIS OF UNSTEADY INCOMPRESSIBLE FLOW OUT OF DIFFERENT TANK CONFIGURATIONS,
by H. H. Seidel. Mar 64, 14p R-92
Contract NAS8-5289
NASA CR-68406

Descriptors: (*Incompressible flow, Measurement).

N66-13093 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Northwestern Univ., Evanston, Ill. Structural Mechanics Lab.
ON THE STABILITY OF EQUILIBRIUM OF CONTINUOUS SYSTEMS.
Technical rept.,
by G. Herrmann and S. Nemat-Nasser. Mar 65, 25p TR-65-1
Grant NsG-605
NASA CR-68434

Descriptors: (*Continuum mechanics, Linear systems), (*Elasticity, Continuum mechanics), Stability, Viscoelasticity.

Identifiers: Galerkin method.

N66-13098 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
AN EVALUATION OF THE EFFECT OF FINITE SHEAR STRAIN IN A SHALLOW, SPHERICAL SHELL,
by H. E. Williams. 1 Oct 65, 26p JPL-TR-32-780
Contract NAS7-100
NASA CR-68395

Descriptors: (*Spheres, Structural shells), (*Shear stresses, Spheres), Loading (Mechanics).

N66-13156 Field 20K, 13C
CFSTI Prices: HC$1.00 MF$0.50
Westinghouse Defense and Space Center, Baltimore, Md.
DETERMINATION OF FRACTURE TOUGHNESS PARAMETER OF LARGE METAL STRUCTURES. INDUSTRIAL REVIEW,
by A. M. Wahl. 10 Dec 64, 13p
Contract NASw-952
NASA CR-68469

Descriptors: (*Fracture (Mechanics), Toughness), (*Steel, Structures), Stresses, Mathematical analysis, Structural properties.

Identifiers: Fracture toughness.

N66-13160 Field 20M, 12A
CFSTI Prices: HC$1.00 MF$0.50
Brown Univ., Providence, R. I.
USE OF A TRANSCENDENTAL APPROXIMATION IN TRANSIENT CONDUCTION ANALYSIS,
by P. D. Richardson and W. W. Smith. Jul 65, 23p
Grant NGR-40-002-012
NASA CR-68536
Prepared in cooperation with Taco, Inc.

Descriptors: (*Thermal conductivity, Approximation (Mathematics)), Calculus of variations, Heating.

Identifiers: Semi-infinite plates.

N66-13162 Field 20D
CFSTI Prices: HC$2.00 MF$0.50
California Univ., Berkeley. Space Sciences Lab.
MEASUREMENTS OF MASS AND MOMENTUM FLUX IN NON-IDEAL MOLECULAR BEAMS,
by F. C. Hurlbut and R. G. Lord. 12 Feb 65, 47p

Contract Nonr-222 (45), Grant NsG-243-62
NASA CR-68538

Descriptors: (*Molecular beams, Fluid mechanics), (*Fluid mechanics, Molecular beams), Momentum, Weight.

N66-13498 Field 20K, 11F
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
INTERFACES BETWEEN FATIGUE, CREEP, AND FRACTURE,
by S. S. Manson. 1965, 88p NASA-TM-X-57035

Descriptors: (*Fracture (Mechanics), Theory), (*Mechanical properties, Metals), Creep, Fatigue (Mechanics).

N66-13551 Field 20K, 20J, 7D
CFSTI Prices: HC$1.00 MF$0.50
Wisconsin Univ., Madison. Theoretical Chemistry Inst.
PATH-INTEGRALS IN DYNAMICS,
by A. M. Arthurs. 1 Nov 65, 19p WIS-TCI-132
Contract DA-11-022-ORD-2059, Grant NsG-275-62
NASA CR-68737

Descriptors: (*Dynamics, Wave functions), Quantum mechanics, Mechanics, Integrals.

N66-13562 Field 20D, 21I
CFSTI Prices: HC$1.00 MF$0.50
Brown Engineering Co., Inc., Huntsville, Ala. Research Labs.
ANALYSIS OF TWO-DIMENSIONAL, UNSTEADY FLOW IN A PROPELLANT TANK UNDER LOW GRAVITY BY FINITE DIFFERENCE METHODS,
by C. T. K. Young. Oct 65, 21p R-164
Contract NAS8-20073
NASA CR-68656

Descriptors: (*Propellant tanks, Two-dimensional flow), Boundary valve problems, Sloshing, Gravity.

N66-13564 Field 20D
CFSTI Prices: HC$2.00 MF$0.50
Brown Engineering Co., Inc., Huntsville, Ala. Research Labs.
HYDROSTATICS OF A FLUID BETWEEN PARALLEL PLATES AT LOW BOND NUMBERS,
by F. W. Geiger. Oct 65, 44p R-159
Contract NAS8-20073
NASA CR-68658

Descriptors: (*Two-phase flow, Boundary layer), (*Hydrostatics, Two-phase flow), Liquids, Vapors, Gravity.

N66-13570 Field 20L
CFSTI Prices: HC$2.00 MF$0.50
University of Southern Calif., Los Angeles. Dept. of Physics.
VACUUM ULTRAVIOLET RADIATION AND SOLID STATE PHYSICS.
Semiannual status rept no. 7, Aug 31 65,
by G. L. Weissler. 15 Oct 65, 33p
Grant NsG-178-61
NASA CR-68499

Descriptors: (*Thin films, Optical properties).

N66-13604 Field 20D
CFSTI Prices: HC$1.00 MF$0.50
Tennessee Univ., Knoxville. Dept. of Engineering Mechanics.
DYNAMICS OF GAS BUBBLES IN AN OSCILLATING PRESSURE FIELD.
Quarterly rept, Jul. - Sep. 65,
by S. S. Douglass, F. N. Peebles, and C. J. Remenyik. Oct 65, 24p EM-65-10-1
Contract NAS8-20152
NASA CR-68301

Descriptors: (*Bubbles, Fluid dynamic properties).

N66-13635 Field 20H
CFSTI Prices: HC$5.00 MF$1.25
Lockheed Nuclear Products, Marietta, Ga.
SHIELDING PROBLEMS IN MANNED SPACE VEHICLES,
by C. W. Hill, W. M. Schofield, and E. C. Smith. Dec 62, 197p ER-5997
Contract NAS8-879
NASA CR-68578

Descriptors: (*Manned spacecraft, Shielding).

N66-13638 Field 20H
CFSTI Prices: HC$2.00 MF$0.50
Grumman Aircraft Engineering Corp., Bethpage, N. Y. Research Dept.
PRODUCTION SPECTRUM OF HIGH ENERGY ELECTRONS FROM HIGH ENERGY COSMIC RAY COLLISIONS,
by J. H. Scanlon and M. S. Spergel. Jun 65, 32p RE-213J
NASA CR-68566

Descriptors: (*Electrons, Production).

N66-13639 Field 20I
CFSTI Prices: HC$5.00 MF$1.00
General Applied Science Labs., Inc., Westbury, N. Y.
DEVELOPMENT OF AN ELECTRON DENSITY PROBE.
Final rept., 22 Jun 64-22 Mar 65,
by M. Abele, R. W. Byrne, and H. Medecki. 9 Apr 65, 152p GASL-TR-527
Contract NAS5-3929
NASA CR-68500

Descriptors: (*Electron density, Measurement).

N66-13640 Field 20H
CFSTI Prices: HC$2.00 MF$0.50
State Univ. of Iowa, Iowa City. Dept. of Physics and Astronomy.
LOW-ENERGY PROTON AND ELECTRON EXPERIMENT FOR THE ORBITING GEOPHYSICAL OBSERVATORIES B AND E,
by L. A. Frank. Jul 65, 35p Rept. no. 65-22
Contract NONR-1509/06/, Grant NsG-233-62,
NASA CR-68558

Descriptors: (*Geophysics, Instrumentation).

Identifiers: Geophysical observatories.

N66-13643 Field 20L
CFSTI Prices: HC$3.00 MF$0.75
Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Nuclear Engineering and Science.
RADIATION DAMAGE TO SEMICONDUCTORS BY HIGH-ENERGY ELECTRON AND PROTON RADIATION.
Progress repi., 15 Mar-15 Sep 65,
by J. C. Corelli. 1965, 91p
Grant NsG-290
NASA CR-68567

Descriptors: (*Semiconductors, Radiation damage).

N66-13647 Field 20F
CFSTI Prices: HC$3.00 MF$0.50
National Bureau of Standards, Washington, D.C. Atomic Physics Div.
MEASUREMENT OF THE VELOCITY OF LIGHT.
Annual rept.
1963, 51p
Contract NASA Order S-49296/G/
NASA CR-68779

Descriptors: (*Light, Velocity).

N66-13648 Field 20K
CFSTI Prices: HC$4.00 MF$1.00
Dynamic Science Corp., Monrovia, Calif.
ANALYSIS AND DESIGN OF ELASTO-PLASTO-VISCOUS POINT VIBRATION DAMPERS.
Final rept.,
by J. C. Peck. 22 Oct 65, 137p SN-62
Contract NAS7-100
NASA CR-68787
Prepared in cooperation with Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena, rept. no. JPL-951 099.

Descriptors: (*Vibration isolators, Design).

N66-13650 Field 20I
CFSTI Prices: HC$6.00 MF$1.50
Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
PROGRESS IN GENERAL PHYSICS, PLASMA DYNAMICS, COMMUNICATION SCIENCES, AND ENGINEERING.
Quarterly progress rept. no. 79, for 31 Aug 65,
by G. G. Harvey and H. J. Zimmermann. 15 Oct 65, 281p

Grants NsG-334, NsG-419,
NASA CR-68785
Prepared in cooperation with Air Force and Dept. of the Army, contracts AF-33 (615)-1083, DA-36-039-AMC03200 (E).

Descriptors: (*Plasma physics, Analysis).

N66-13827 **Field 20M**
CFSTI Prices: HC$3.00 MF$0.75
United Aircraft Corp., East Hartford, Conn.
EXPERIMENTAL REFRACTIVE INDICES AND THEORETICAL SMALL-PARTICLE SPECTRAL PROPERTIES OF SELECTED METALS,
by W. G. Burwell, N. L. Krascella, and P. S. Marteney. Sep 65, 67p D-910092-6
Contract NASw-847
NASA CR-68865

Descriptors: (*Metals, Particles), (*Heat transfer, Control), (*Particles, Heat transfer).

Identifiers: Radiative heat transfer, Nuclear rockets, Seeding.

N66-13828 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
United Aircraft Corp., East Hartford, Conn.
EXPERIMENTAL INVESTIGATION OF PERIPHERAL-WALL INJECTION TECHNIQUES IN A WATER VORTEX TUBE,
by A. Travers. Sep 65, 50p D-910091-7
Contracts NASw-847, NAS5-9107
NASA CR-68866

Descriptors: (*Hilsch tubes, Injection).

N66-13834 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
General Electric Co., Philadelphia, Pa. Missile and Space Div.
COATING SELECTION PROGRAM, PART I. THEORY,
by F. Costello. 15 Apr 65, 48p 65 SD 526
Contract NASw-960
NASA CR-68860

Descriptors: (*Spacecraft, Coatings).

N66-13835 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
United Aircraft Corp., East Hartford, Conn.
EXPERIMENTAL INVESTIGATION OF THE EFFECT OF PERIPHERAL-WALL INJECTION TECHNIQUE ON TURBULENCE IN AN AIR VORTEX TUBE,
by D. J. Mc Farlin. Sep 65, 49p D-910091-5
Contract NASw-847
NASA CR-68867

Descriptors: (*Hilsch tubes, Injection).

N66-13836 **Field 20K**
CFSTI Prices: HC$4.00 MF$1.00
Lockheed Missiles and Space Co., Sunnyvale, Calif.
JUNCTURE STRESS FIELDS IN MULTICELLULAR SHELL STRUCTURES. VOLUME IV - STRESSES AND DEFORMATIONS OF FIXED-EDGE SEGMENTAL SPHERICAL SHELLS.
Final rept.,
by C. T. Chen, P. Stern, and E. Y. W. Tsui. Jul 65, 139p LMSC-M-77-65-4
Contract NAS8-11480
NASA CR-68766

Descriptors: (*Spheres, Stresses).

N66-13837 **Field 20K**
CFSTI Prices: HC$4.00 MF$1.00
Lockheed Missiles and Space Co., Sunnyvale, Calif.
JUNCTURE STRESS FIELDS IN MULTICELLULAR SHELL STRUCTURES. VOLUME III - STRESSES AND DEFORMATIONS ON FIXED-EDGE SEGMENTAL CONICAL SHELLS.
Final rept.,
by J. M. Massard, P. Stern, and E. Y. W. Tsui. Jun 65, 126p LMSC-M-77-65-2
Contract NAS8-11480
NASA CR-68774

Descriptors: (*Conical bodies, Stresses).

N66-13850 **Field 20F**
CFSTI Prices: HC$2.00 MF$0.50
National Bureau of Standards, Washington, D.C.
FLUX AVERAGING DEVICES FOR THE INFRARED,
by S. T. Dunn. 9 Dec 65, 44p NBS-TN-279
Contract NASA Order R-09-022-032
NASA CR-68761

Descriptors: (*Infrared detectors, Sensitivity).

N66-14152 **Field 20N, 20C**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
LAUNCHING OF SURFACE WAVES ON AXIAL-CYLINDRICAL REACTIVE SURFACE,
by N. C. Wenger. Jan 66, 33p NASA-TN-D-3180

Descriptors: (*Electromagnetic waves, Surfaces), Cylindrical bodies.

N66-14153 **Field 20D, 22B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administation, Cleveland, Ohio. Lewis Research Center.
STATIC AERODYNAMIC CHARACTERISTICS OF A ROCKET VEHICLE WITH THICK WEDGE FINS AND SWEPTBACK LEADING AND TRAILING EDGES,
by J. A. Yuska. Jan 66, 16p NASA-TN-D-3182

Descriptors: (*Aerodynamic characteristics, Rockets), (*Rockets, Aerodynamic characteristics), Aerodynamic control surfaces, Supersonic wind tunnels, Stability.

N66-14154 **Field 20M, 20D**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
EXPERIMENTAL INVESTIGATION OF NOZZLE CRITICAL FLOW CHARACTERISTICS OF SODIUM VAPOR,
by L. J. Goldman and S. M. Nosek. Jan 66, 21p NASA-TN-D-3183

Descriptors: (*Sodium, Nozzle gas flow), (*Convergent divergent nozzles, Vapors), Vapor pressure.

N66-14237 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
CONDENSATION PRESSURE DROP OF NONWETTING MERCURY IN A UNIFORMLY TAPERED TUBE IN 1-G AND ZERO-GRAVITY ENVIRONMENTS,
by J. A. Albers and R. P. Macosko. Jan 66, 40p NASA-TN-D-3185

Descriptors: (*Mercury, Fluid mechanics), (*Pressure, Mercury), Gravity, Fluid flow, Vapors, Pipes.

N66-14385 **Field 20D**
CFSTI Prices: HC$3.00 MF$0.75
Iowa State Univ. of Science and Technology, Ames.
THROUGH-FLOW SOLUTION FOR AXIAL-FLOW TURBOMACHINE BLADE ROWS,
by P. Kavanagh and G. K. Serovy. Jan 66, 94p

Grant NsG-62
NASA CR-363

Descriptors: (*Axial-flow turbines, Incompressible flow), Iterative methods.

N66-14386 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Huntsville, Ala. George C. Marshall Space Flight Center.
THE GENERAL INSTABILITY OF RING-STIFFENED CORRUGATED CYLINDERS UNDER AXIAL COMPRESSION,
by R. H. Brolliar and J. N. Dickson. Jan 66, 37p NASA-TN-D-3089

Descriptors: (*Stiffened cylinders, Compressive properties).

N66-14389 **Field 20M**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
THERMOPOTENTIAL MEASUREMENTS OF ALKALI HALIDES,
by J. Greenberg. Jan 66, 9p NASA-TN-D-3179

Descriptors: (*Alkali metal compounds, Thermo dynamics), (*Halides, Thermodynamics), Cesium, Potassium, Sodium.

N66-14390 **Field 20D**
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
POSSIBLE OCCURRENCE OF BOUNDARY SHOCK WAVES,
by E. D. Martin. Jan 66, 53p NASA-TN-D-3195

Descriptors: (*Atmosphere entry, Ablation), (*Boundary layer, Heat transfer), (*Shock waves, Propagation).

N66-14713 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
PLANE THERMOELASTIC DEFORMATION OF INTERNALLY HEATED ANNULAR DISKS OR HOLLOW CYLINDERS,
by F. B. Fuller. Jan 66, 49p NASA-TR-R-229

Descriptors: (*Cylindrical bodies, Deformation), (*Thermoelasticity, Cylindrical bodies).

N66-14760 **Field 20D**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
EXPERIMENTAL NOZZLE EXPANSION AND FLOW CHARACTERISTICS OF POTASSIUM VAPOR,
by L. J. Goldman and S. M. Nosek. Jan 66, 26p NASA-TN-D-3209

Descriptors: (*Potassium, Vapors).
Identifiers: Nozzle expansion.

N66-14761 **Field 20D**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
EXPERIMENTAL INVESTIGATION OF STABILITY BOUNDARIES FOR PLANAR AND NONPLANAR SLOSH- ING IN SPHERICAL TANKS,
by I. E. Sumner. Jan 66, 20p NASA-TN-D-3210

Descriptors: (*Sloshing, Stability), (*Boundary layer, Stability).

N66-14903 **Field 20C**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
BEHAVIOR OF A SINGLE-TURN MAGNETIC COIL UNDER DYNAMIC LOAD CONDITIONS,
by G. K. Oertel and M. D. Williams. Jan 66, 14p NASA-TN-D-3199

Descriptors: (*Magnetic coils, Stresses), Plasma physics.

N66-14907 **Field 20L**
CFSTI Prices: HC$2.00 MF$0.50
Oklahoma State Univ., Stillwater.
A PRELIMINARY STUDY OF CERTAIN ELECTRICAL PROPERTIES OF STANNIC OXIDE CERAMICS,
by E. E. Kohnke and H. E. Matthews. Jan 66, 41p
Grant NsG-609
NASA CR-376

Descriptors: (*Ceramic materials, Electrical properties), (*Tin compounds, Oxides).

N66-14909 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
COMPARISON OF FULL-SCALE AND MODEL BUFFET RESPONSE OF APOLLO BOILERPLATE SERVICE MODULE,
by R. V. Doggett, Jr. Jan 66, 13p NASA-TM-X-1202

Descriptors: (*Spacecraft, Boiler tubes), (*Boiler tubes, Vibration), Buffeting.

Identifiers: Apollo.

NYO-3399-09 **Field 20H**
CFSTI Prices: HC$3.00 MF$0.50
Imperial Coll. of Science and Tech., London (England).
REDUCTION OF REPRESENTATIONS OF SU (MN) WITH RESPECT TO THE SUBGROUP SUm, SUn,
by C. R. Hagen and A. J. Macfarlane. 1964, 32p

Contract AT (30-1)-3399

Descriptors: (*Nuclear structure, Elementary parti cles), (*Elementary particles, Nuclear structure).

NYO-3402-1 **Field 20C, 20M**
CFSTI Prices: HC$1.00 MF$0.50
Pittsburgh Univ., Pa. Dept. of Chemistry.
MAGNETO-THERMODYNAMICS OF PARA- AND ANTIFERROMAGNETS.
Annual rept. 1 Jun 64-1 Mar 65,
by R. A. Butera. 1 Mar 65, 25p
Contract AT (30-1)-3402

Descriptors: (*Magnetic materials, Cryogenics), (*Single crystals, Magnetic properties).

ORNL-3914 **Field 20H, 12A**
CFSTI Prices: HC$3.00 MF$0.75
Oak Ridge National Lab., Tenn.
R-MATRIX APPROACH TO COMPLEX ANGULAR MOMENTUM AND TO THREE-PARTICLE INTERACTION.
Doctoral thesis,
by Ralph Roskies. Jan 66, 91p
Contract W-7405-eng-26
Submitted to Princeton Univ.

Descriptors: (*Nuclear scattering, Matrix algebra), (*Matrix algebra, Nuclear scattering).

PB-169 198 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Lockheed Missiles and Space Co., Sunnyvale, Calif.
ANALYSIS OF SHORT CYLINDRICAL SHELLS OF VARIABLE WALL THICKNESS,
by W. E. Jahsman and O. Hoffman. 1965, 16p
Rept. no. 6-75-65-55

Descriptors: (*Structural shells, Stresses), (*Cylindrical bodies, Stresses), Moments, Rotation, Matrix algebra, Walls, Thickness.

Transfer matrices are developed relating stress resultants, moments, displacements, and rotations at the two ends of a short cylindrical shell with variable wall thickness. The matrix elements are derived through Taylor's expansions for the variables (including the wall thickness variation) and may be made as accurate as desired by retaining additional terms in the expansion. Influence coefficient expressions are derived and compared with results obtained previously for cylinders with constant and parabolic wall thicknesses. Good agreement is found in all cases. The transfer matrices appear to have particular merit for use with computer programs which require excessive run time or suffer from numerical instabilities when wall variation is rapid. (Author)

TID-20450 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana.
K MINUS-P TOTAL AND ELASTIC CROSS SECTIONS AT 1.34 BEV/C,
by R. I. Hulsizer, J. R. Ficenec, D. W. Mortara and W. P. Trower. 1964, 9p
Contract AT (11-1)-1195

Descriptors: (*Nuclear particles, Elastic scattering), (*Elastic scattering, Pions).

TID-21531 **Field 20D, 20M**
CFSTI Prices: HC$5.00 MF$1.50
Illinois Univ., Urbana.
MOTION AND HEAT TRANSFER OF DROPLETS AT LARGE REYNOLDS AND PECLET NUMBER.
Final rept. no. 3, Feb 65,
by S. Winnikow and B. T. Chao. Feb. 65, 172p

Contract AT (11-1)-1069

Descriptors: (*Heat transfer, Drops), (*Motion, Drops).

UCRL-16407 **Field 20M, 7D**
CFSTI Prices: HC$3.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Berkeley.
THE CALCULATION OF VAPOR-LIQUID-EQUILIBRIA FROM AN EQUATION OF STATE,
by J. A. Hoiberg. Sep 65, 56p
Contract W-7405-eng-48

Descriptors: (*Thermodynamics, Phase studies), (*Equations of state, Thermodynamics), Vapors, Liquids.

21. PROPULSION AND FUELS

AD-458 424 **Field 21H, 20A, 21I**
CFSTI Price: HC$2.00
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
INTERACTION BETWEEN SOUND AND FLOW IN ACOUSTIC CAVITIES: MASS, MOMENTUM, AND ENERGY CONSIDERATIONS,
by R. H. Cantrell and R. W. Hart. Apr 63, 36p TG-335-15
Contract NOw-62-0604-c

Descriptors: (*Rocket motors (Solid propellant), Acoustic properties), (*Acoustics, Rocket motors (Solid propellant)), Combustion chambers, Exhaust gases, Fluid flow, Sound, Momentum, Energy, Excitation, Attenuation, Solid rocket propellants.

The paper investigates requirements for neutral acoustic stability in cavities with a transpiring wall where there is a mean flow in the absence of acoustic disturbances. The growth rates of the acoustic fields are also considered, and the results are shown to be in agreement with those calculated from first-order admittance considerations. The effect of mean flow is often of considerable importance, and the extent to which flow tends to excite or damp the acoustic field is related to mode configuration and flow field geometry. Application to the problem of determining the acoustic response of burning rocket propellants is discussed. (Author)

CONF-640810 **Field 21F, 13J**
CFSTI Prices: HC$2.25 MF$1.25
Virginia Polytechnic Inst., Blacksburg.
PROCEEDINGS OF THE CONFERENCE ON NUCLEAR MARINE PROPULSION HELD AT VIRGINIA POLY -TECHNIC INSTITUTE, BLACKSBURG, VIRGINIA, AUGUST 10-13, 1964.
1964, 200p
Contract AT (40-1)-3239

Descriptors: (*Marine nuclear propulsion, Merchant vessels), (*Shipping (Marine), Nuclear powered vessels).

N66-12855 **Field 21I, 21B, 22D**
CFSTI Prices: HC$3.00 MF$0.75
General Applied Science Labs., Inc., Westbury, N. Y.
INVESTIGATION OF COMBUSTION OF HYDROGEN IN A HYPERSONIC AIR-STREAM.
Final rept.,
by S. Slutsky. Mar 65, 70p GASL-TR-529
Contract NAS8-2686
NASA CR-68191

Descriptors: (*Hydrogen, Rocket propellants), (*Launch vehicles (Aerospace), Hazards), Combustion, Hypersonic flow, Air, Ventilation.

N66-13083 **Field 21I**
CFSTI Prices: HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
AEROTHERMOCHEMICAL ANALYSIS OF NONOSCILLATORY AND OSCILLATORY CHARACTERISTICS OF LIQUID BIPROPELLANT ROCKET MOTORS - WAVE MODEL, DROPLET HEATING, AND EVAPORATION PROGRAM COMPUTATION.
Quarterly rept. no. 3,
by V. D. Agosta and S. Z. Burstein. 15 Jan 65, 18p Rept. no. 65-1
Contract NAS7-100
NASA CR-68546

Descriptors: (*Liquid rocket propellants, Thermochemistry), (*Evaporation, Computers (Pro gramming)), Rocket motors.

Identifiers: Aerothermochemistry.

N66-13124 **Field 21F, 21H**
CFSTI Prices: HC$2.00 MF$0.50
Aerojet-General Corp., Sacramento, Calif.
DESIGN SPECIFICATION ENGINE, ROCKET, NUCLEAR, XE-1. NERVA PROGRAM,
by E. Landesberg. Mar 65, 38p AGC-90016, RN-DR-0020
Contract SNP-1
NASA CR-68622

Descriptors: (*Nuclear propulsion, Rockets), Design, Specifications.

Identifiers: NERVA program.

N66-13125 **Field 21F, 21H**
CFSTI Prices: HC$6.00 MF$1.50
Aerojet-General Corp., Sacramento, Calif. Rocket Engine Operations.
STUDIES OF THE NERVA PROGRAM.
Quarterly rept. no. 3, Apr - Jun 65.
30 Sep 65, 298p RN-Q-0036
Contract SNP-1
NASA CR-68623

Descriptors: (*Nuclear propulsion, Rockets), Ground support systems, Instrumentation, Radiation damage.

Identifiers: NERVA program.

N66-13167 **Field 21I**
CFSTI Prices: HC$2.00 MF$0.50
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
CATALYSIS OF HYDROGEN-ATOM RECOMBINATION IN ROCKET NOZZLES,
by J. A. Lordi and R. E. Mates. Jul 65, 49p
CAL-AD-1689-A-5
Contract NASR-109
NASA CR-68543

Descriptors: (*Recombination reactions, Hydrogen), (*Rocket motor nozzles, Recombination reactions), Gases, Catalysis, Atoms.

N66-13634 **Field 21I**
CFSTI Prices: HC$3.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
AEROTHERMOCHEMICAL ANALYSIS OF NON-OSCILLATORY AND OSCILLATORY CHARACTERISTICS OF LIQUID BIPROPELLANT ROCKET MOTORS DROPLET EVAPORATION, WAVE EQUATIONS, MOTOR INSTRUMENTATION, NON-OSCILLATORY PROGRAM COMPUTATION,
by V. D. Agosta and S. Z. Burstein. 15 Apr 65, 53p Rept. no. 65-2
Contract NAS7-100
NASA CR-68576

Descriptors: (*Liquid rocket propellants, Vaporization).

N66-13642 **Field 21I**
CFSTI Prices: HC$4.00 MF$0.75
California Univ., Berkeley. Space Sciences Lab.
GENERATION OF FLOW FIELDS IN PARTICLE FUELED COMBUSTION SYSTEMS.
Technical note no. 1,
by C. W. Busch. May 65, 105p
Grant NsG-702
NASA CR-68478

Descriptors: (*Fuels, Combustion).

N66-14156 **Field 21H, 22D, 21I**
CFSTI Prices: HC$2.00 MF$0.50
Atlantic Research Corp., Alexandria, Va.
DESIGN, TEST, AND DOCUMENTATION OF THE MARC 36 A1, 1 KS-75 SPIN MOTOR FOR THE SCOUT VEHICLES.
Jan 66, 45p
Contract NAS1-3899
NASA CR-359
Prepared in cooperation with Ling-Temco-Vought, Inc., Dallas, Tex.

Descriptors: (*Rocket motors (Solid propellant), Captive tests), (*Solid rocket propellants, Performance (Engineering)), Launch vehicles (Aerospace).

Identifiers: Mark 36 motors, Scout project.

N66-14701 **Field 21C**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
MANNED MARS LANDING MISSIONS USING ELECTRIC PROPULSION,
by L. H. Fishback, J. S. MacKay, W. C. Strack, F. J. Hrach, and L. G. Rossa. Jan 66, 31p NASA-TN-D-3194

Descriptors: (*Mars, Landings), (*Manned spacecraft, Electric propulsion).

N66-14708 **Field 21H**
CFSTI Prices: HC$3.00 MF$1.00
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
INVESTIGATION OF HYDROTEST FAILURE OF THIOKOL CHEMICAL CORPORATION 260-INCH-DIAMETER SL-1 MOTOR CASE,
by J. B. Esgar and J. E. Srawley. Jan 66, 105p
NASA-TM-X-1194

Descriptors: (*Solid rocket propellants, Rocket motors), (*Rocket motors, Failure (Mechanics).

PB-169 143 **Field 21I, 7D, 21B**
CFSTI Prices: HC$1.00 MF$0.50
Jet Propulsion Lab., California Inst. of Tech., Pasadena.
REACTION KINETICS OF ROCKET PROPELLANT GASES: I. RATE OF DECOMPOSITION OF NITRIC OXIDE AT ELEVATED TEMPERATURES.
Progress rept. on Basic Research on Rocket Propellants,
by Henry Wise and Maurice F. Frech. 27 Mar 50, 23p Rept. no. PR-9-46
Contract W-04-200-ORD-1482,
Proj. TU2-1

Descriptors: (*Rocket propellants, Gases), (*Oxidizers, Decomposition), (*Nitrogen compounds, Oxides), Solid rocket oxidizers, Liquid rocket oxidizers, Reaction kinetics, Combustion, Com bustion chamber gases, Pyrolysis, Thermochemistry.

Identifiers: Nitrogen oxides.

The report is the first in a series designed to study in detail the kinetic behavior of NO in order to interpret the combustion mechanisms in which nitrogen oxides participate. A review of the experimental results reported for the reaction kinetics of NO points to the need of additional information on the rate of decomposition of NO over a range of temperatures in the absence of metallic surfaces or refractories. In order to study more accurately the mechanism of this reaction at temperatures below 1300K, a static system was chosen in which the residence time of the gas could be varied over wide limits not attainable in the dynamic method. Essentially the experimental procedure consisted of introducing a known concentration of NO into the reaction vessel for a given time interval. The temperature of the gas during this period is accurately measured and maintained at the desired value. At the end of the reaction time the gas mixture is rapidly chilled by allowing the products of the reaction to expand into an evacuated vessel cooled by liquid nitrogen. The extent of the decomposition is determined by quantitative analysis of the decomposition products. From the results of these measurements, the kinetics of the reaction are given by two rate expressions. Over the entire temperature region studied (700 to 1300K) the decomposition of nitric oxide obeys a second-order rate law. It is concluded that the observed reaction is a composite one made up of two or more concurrent reactions differently influenced by temperature.

SC-RR-65-557 **Field 21F, 18I**
CFSTI Prices: HC$1.00 MF$0.50
Sandia Corp., Albuquerque, N. Mex.
EVALUATION OF MICROSCOPIC-SIZED GRAPHITE AEROSOL FROM A ROVER REACTOR DESTRUCTION TEST, JUNE 1965,
by D. R. Parker. Dec 65, 15p
Contract AT (29-1)-789

Descriptors: (*Nuclear propulsion, Safety), (*Graphite, Aerosols).

Identifiers: Rover reactor.

22. SPACE TECHNOLOGY

N66-12856 **Field 22B, 5I**
CFSTI Prices: HC$3.00 MF$0.50
Hughes Aircraft Co., Culver City, Calif. Aerospace Group.
MANUAL ATTITUDE CONTROL SYSTEMS, VOLUME II - DISPLAY FORMAT CONSIDERATIONS,
by R. O. Besco. Mar 64, 53p P-64-22
Contract NASw-620
NASA CR-68192

Descriptors: (*Attitude control systems, Spacecraft), (*Display systems, Attitude control systems), Flight simulators.

N66-12857 **Field 22B, 22A**
CFSTI Prices: HC$3.00 MF$0.75
Bellcomm, Inc., Washington, D. C.
THE METEOROID ENVIRONMENT OF PROJECT APOLLO, EDITION 2,
by G. T. Orrok. 20 Feb 64, 68p
NASA CR-68189

Descriptors: (*Meteors, Space environmental conditions), (*Spacecraft, Hazards), Lunar probes, Structural parts, Thickness.

Identifiers: Apollo.

N66-12869 **Field 22C**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, George C. Marshall Space Flight Center, Huntsville, Ala.
PARAMETRIC PERFORMANCE ANALYSIS OF LUNAR MISSIONS. PART II. LUNAR DESCENT,
by C. M. Akridge and S. H. Harlin. 2 May 63, 39p NASA-TM-X-56960

Descriptors: (*Lunar probes, Descent trajectories), (*Descent trajectories, Soft landings), Parking orbit trajectories, Thrust, Weight.

N66-12973 **Field 22C, 22B**
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.

SATELLITE SITUATION REPORT, VOLUME 5, NO. 2.
31 Oct 65, 55p NASA-TM-X-56997, X-537-65-217

Descriptors: (*Satellites (Artifical), Data), Identification, Operation, Experimental data, Orbital trajectories.

N66-13009 **Field 22A**
CFSTI Prices: HC$2.00 MF$0.50
Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
LUNAR NAVIGATION STUDY, SUMMARY VOLUME.
Final rept., Jun 64-May 65,
by L. J. Abbeduto, M. E. Amdursky, D. K. Breseke, J. T. Broadbent, and R. A. Gill. Jun 65, 46p BSR-1134
Contract NAS8-11292
NASA CR-68316

Descriptors: (*Moon, Exploration), (*Lunar surface vehicles, Navigation), (*Guidance, Lunar surface vehicles).

N66-13018 **Field 22C**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
ON THE NUMERICAL THEORY OF SATELLITES WITH HIGHLY INCLINED ORBITS.
Technical note,
by Peter Musen. Dec 65, 26p NASA-TN-D-3084

Descriptors: (*Inclined orbit trajectories, Perturba tion theory), (*Satellites (Artificial), Inclined orbit trajectories).

N66-13077 **Field 22C**
CFSTI Prices: HC$2.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
OUTER ZONE ELECTRONS,
by D. J. Williams. 1965, 34p
Contract NASA Order R-21
NASA CR-68404
Prepared for presentation at Advanced Study Inst. (Radiation Trapped in the Earth's Magnetic Fields) 16 Aug-3 Sep 65, Bergen.

Descriptors: (*Upper atmosphere, Electrons), (*Electrons, Upper atmosphere).

N66-13087 **Field 22C**
CFSTI Prices: HC$2.00 MF$0.50
Battelle Memorial Inst., Columbus, Ohio.
GRAVITY-ASSISTED TRAJECTORIES FOR MANNED SPACE EXPLORATION,
by D. S. Edgecombe, R. G. Luce, and R. F. Porter. 23 Sep 65, 50p BMI-NLVP-FTR-65-1
Contract NASw-1146
NASA CR-68447

Descriptors: (*Trajectories, Manned spacecraft), (*Gravity, Trajectories), Space probes.

N66-13088 **Field 22D, 21I**
CFSTI Prices: HC$4.00 MF$1.00
Melpar, Inc., Falls Church, Va. Research Div.
INVESTIGATION OF THE EFFECTS OF MECHANICAL STRESS ON THE PERMEABILITY OF ENGINEERING MATERIALS TO CERTAIN CRYOGENIC AND STORABLE PROPELLANTS USED IN LAUNCH VEHICLES.
Annual summary rept, 30 Jun 64 - 30 Jun 65,
by W. R. DeBoskey, A. Divecha, H. Hahn, and P. J. Lare. Sep 65, 143p
Contract NAS8-11322
NASA CR-68411

Descriptors: (*Storable propellants, Compatibility), (*Launch vehicles (Aerospace), Materials), Cryogenics, Rocket propellants, Stresses, Permeability.

N66-13130 **Field 22C**
CFSTI Prices: HC$3.00 MF$0.75
Western Development Labs., Philco Corp., Palo Alto, Calif.
INTERPLANETARY NAVIGATION AND GUIDANCE STUDY. VOLUME I. SUMMARY.
30 Oct 65, 73p WDL-TR-2629, VOL. I
Contract NAS8-11198
NASA CR-68548

Descriptors: (*Spacecraft, Guidance), (*Navigation, Spacecraft).

Identifiers: Interplanetary guidance.

N66-13519 **Field 22B, 14D**
CFSTI Prices: HC$3.00 MF$0.50
AVCO Corp., Nashville, Tenn. Aerospace Structures Div.
OPTIMIZATION OF SATURN IB AND V MOUNTING AND THERMAL CONDITIONING PANELS.
Final rept.,
by D. L. Manor. 18 Oct 65, 55p R-1051
Contract NAS8-11870
NASA CR-68697

Descriptors: (*Launch vehicles (Aerospace), Reliability), Optimization, Stresses, Structural properties, Weight.

Identifiers: Saturn (Booster).

N66-13556 **Field 22B, 17G, 21H, 17B**
CFSTI Prices: HC$7.00 MF$2.00
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-35, VOLUME IV FOR THE PERIOD AUGUST 1, 1965 TO SEPTEMBER 30, 1965. SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT.
31 Oct 65, 374p JPL-SPS-37-35, Vol. IV
Contract NAS7-100
NASA CR-68793

Descriptors: (*Space flight, Research program administration), Guidance, Control, Propulsion, Communication systems, Spacecraft.

N66-13557 **Field 22B, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MARINER IV SCIENCE PLATFORM STRUCTURE AND ACTUATOR DESIGN, DEVELOPMENT AND FLIGHT PERFORMANCE,
by G. Coyle. 15 Nov 65, 23p JPL TR-32-832
Contract NAS7-100
NASA CR-68571

Descriptors: (*Space probes, Instrumentation), Spacecraft, Scanning, Design, Performance (Engineering).

Identifiers: Mariner.

N66-13569 **Field 22B**
CFSTI Prices: HC$2.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
SATELLITE 1963 38 C.
Semiannual rept. for 30 Sep 65.
Oct 65, 35p SIP-86-65
Contract NASA O R-21
NASA CR-68649

Descriptors: (*Charged particles, Detectors).

N66-13574 **Field 22A**
CFSTI Prices: HC$7.27 MF$2.25
Aeronutronic Div., Philco Corp., Newport Beach, Calif.
STUDY OF A HIGH RESOLUTION FACSIMILE SYSTEM EXPERIMENT ON THE SURFACE OF THE PLANET MARS.
Final rept.
25 Feb 65, 427p U-3034
NASA CR-68626
Prepared in cooperation with Jet Propulsion Lab., Calif. Inst. of Tech. Pasadena, rept. no. JPL-950996.

Descriptors: (*Mars, Facsimile recording systems).

N66-13768 **Field 22B**
CFSTI Prices: HC$2.00 MF$0.50
Smithsonian Institution, Cambridge, Mass. FI Astrophysical Observatory.
OBSERVATION OF THE GT-5 ROCKET-BODY REENTRY - PRELIMINARY ANALYSIS,
by L. H. Solomon. 22 Oct 65, 34p SAO-191
Grants NsG-87-60, NsG-563
NASA CR-68699

Descriptors: (*Reentry vehicles, Atmosphere entry), (*Launch vehicles (Aerospace), Atmosphere entry).

Identifiers: Gemini project, Titan lanch vehicle, GT-5 rocket body.

N66-13840 **Field 22A**
CFSTI Prices: HC$1.00 MF$0.50
Smithsonian Institution, Cambridge, Mass. Astrophysical Observatory.
SMITHSONIAN ASTROPHYSICAL OBSERVATORY SPECIAL REPORT,
by L. G. Jacchia and F. Verniani. 12 Nov 65, 13p SAO-193
Grant NsG-87-60
NASA CR-68782

Descriptors: (*Atmosphere, Density).

Identifiers: San Marco satellite.

N66-13842 **Field 22A**
CFSTI Prices: HC$3.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SYSTEMS ENGINEERING IN SPACE EXPLORATION.
1 Jun 65, 55p
Contract NAS7-100
NASA CR-68801

Descriptors: (*Systems engineering, Spacecraft).

N66-13959 **Field 22B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
SATELLITE SITUATION REPORT, VOLUME 5, NO. 19.
15 Oct 65, 21p NASA-TM-X-56999, X-537-65-217

Descriptors: (*Orbital trajectories, Artificial satellites).

N66-14051 **Field 22D, 20K**
CFSTI Prices: HC$5.00 MF$1.00
Space Technology Labs., Inc., Redondo Beach, Calif.
IMPROVED ANALYTIC LONGITUDINAL RESPONSE ANALYSIS FOR AXISYMMETRIC

LAUNCH VEHICLES. VOLUME I. LINEAR ANALYTIC MODEL,
by J. S. Archer and C. P. Rubin. Dec 65, 164p

Contract NAS1-4351
NASA CR-345

Descriptors: (*Launch vehicles (Aerospace), Asymmetric bodies), Mathematical models, Linear systems.

N66-14052 **Field 22D, 9B, 20K**
CFSTI Prices: HC$4.00 MF$1.00
Space Technology Labs., Inc., Redondo Beach., Calif.
IMPROVED ANALYTIC LONGITUDINAL RESPONSE ANALYSIS FOR AXISYMMETRIC LAUNCH VEHICLES. VOLUME II. COMPUTER PROGRAM DESCRIPTION,
by C. P. Rubin and T. T. Wang. Dec 65, 143p

Contract NAS1-4351
NASA CR-346

Descriptors: (*Launch vehicles (Aerospace), Asymmetric bodies), (*Programming (Computers), Launch vehicles (Aerospace)).

N66-14058 **Field 22C, 20K**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Houston, Tex. Manned Spacecraft Center.
PRACTICAL LIMITS FOR BALSA IMPACT LIMITERS,
by D. Bresie. Jan 66, 18p NASA-TN-D-3175

Descriptors: (*Landing impact, Space probes), (*Deceleration, Landing impact), Velocity, Spheres.

N66-14155 **Field 22C**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
OPTIMIZATION OF DOUBLE-CONIC INTERPLANETARY TRAJECTORIES,
by E. A. Willis, Jr. Jan 66, 41p NASA-TN-D-3184

Descriptors: (*Interplanetary trajectories, Optimization), Space flight.

N66-14158 **Field 22A**
CFSTI Price: MF$0.75
National Academy of Sciences-National Research Council, Washington, D. C. Prevention of Deterioration Center.
THE METEOROID ENVIRONMENT AND ITS EFFECTS ON MATERIALS AND EQUIPMENT,
by W. A. Cosby and R. G. Lyle. 1965, 119p
NASA SP-78
Hard copy available from Superintendent of Documents, G.P.O., Washington, D. C., 20402, $0.50.

Descriptors: (*Space environmental conditions, Meteors), (*Meteors, Impact shock), Materials.

N66-14702 **Field 22B**
CFSTI Price: MF$2.00
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MARINER-VENUS 1962.
Final project rept.
1965, 380p
Contract NAS7-100
NASA SP-59
Hard copy available from Superintendent of Documents, GPO, Washington, D. C. 20402, $2.50/.

Descriptors: (*Space probes, Performance (Engineering).

Identifiers: Mariner II, Venus probe, Flyby mission.

N66-14703 **Field 22A**
CFSTI Prices: HC$4.00 MF$0.75
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
MANNED MARS LANDING MISSION BY MEANS OF HIGH-THRUST ROCKETS,
by R. R. Burley, J. D. Eisenberg, J. M. Kappraff, R. W. Luidens, and B. A. Miller. Jan 66, 113p NASA-TN-D-3181

Descriptors: (*Mars, Landings), (*Manned spacecraft, Mars).

N66-14704 **Field 22A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
PAYLOAD OPTIMIZATION OF MULTISTAGE LAUNCH VEHICLES,
by O. F. Spurlock and F. Teren. Jan 66, 54p
NASA-TN-D-3191

Descriptors: (*Payload, Optimization), (*Launch vehicles (Aerospace), Payload).

N66-14826 **Field 22A**
CFSTI Price: MF$2.25
National Aeronautics and Space Administration, Washington, D. C.
NASA 1965 SUMMER CONFERENCE ON LUNAR EXPLORATION AND SCIENCE.
1965, 448p NASA-SP-88
Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $1.50.

Descriptors: (*Moon, Exploration).

Identifiers: Apollo/Lesa project.

N66-14901 **Field 22A**
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
LANDING CHARACTERISTICS OF THE APOLLO SPACECRAFT WITH DEPLOYED-HEAT-SHIELD IMPACT ATTENUATION SYSTEMS,
by S. M. Stubbs. Jan 66, 55p NASA-TN-D-3059

Descriptors: (*Spacecraft, Landing).

Identifiers: Apollo.

N66-14902 **Field 22C**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
A STUDY OF THE ACCURACY OF ESTIMATING THE ORBITAL ELEMENTS OF A LUNAR SATELLITE BY USING RANGE AND RANGE-RATE MEASUREMENTS,
by H. R. Compton. Jan 66, 41p NASA-TN-D-3140

Descriptors: (*Lunar satellites, Orbital trajectories).

N66-14910 **Field 22B**
CFSTI Prices: HC$5.00 MF$1.00
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
A COMPENDIUM OF AEROBEE SOUNDING ROCKET LAUNCHINGS FROM 1959 THROUGH 1963,
by J. R. Busse and M. T. Leffler. Jan 66, 176p
NASA-TR-R-226

Descriptors: (*Sounding rockets, Performance (Engineering), (*Launch vehicles (Aerospace), Design).

N66-15192 **Field 22C**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
EFFICIENT PLANETARY PARKING ORBITS WITH EXAMPLES FOR MARS,
by R. W. Luidens and B. A. Miller. Jan 66, 40p
NASA-TN-D-3220

Descriptors: (*Parking orbit trajectories, Mars).

NAA-SR-11704 **Field 22C, 20D**
CFSTI Prices: HC$2.00 MF$0.50
Atomics International, Canoga Park, Calif.
METHODS FOR PREDICTING AERODYNAMIC HEATING RATES TO HIGH-VELOCITY BODIES IN THE UPPER ATMOSPHERE,
by R. D. Elliott. 15 Jan 66, 37p
Contract AT (11-1)-GEN-8

Descriptors: (*Aerodynamic heating, Reentry ve hicles), (*Atmosphere entry, Auxiliary power plants).

PB-169 381 **Field 22C**
CFSTI Prices: HC$2.60 MF$0.50
Weather Bureau, Washington, D. C. Techniques Development Lab.
ATMOSPHERIC EFFECTS ON RE-ENTRY VEHICLE DISPERSIONS.
Technical note,
by Karl R. Johannessen. Dec 65, 28p WBTN-29-TDL-3

Descriptors: (*Atmosphere entry, Meteorological parameters), (*Reentry vehicles, Atmosphere entry), Wind, Density, Descent trajectories, Aerodynamics.

Wind and density variability cause dispersion of the trajectory of reentry vehicles and of the altitude signalled by inertial altimetry systems. These effects are analyzed and formulas are developed for them which make use of the basic trajectory data (no wind, standard density) and conventional statistical data available from the meteorological archives. The procedure makes it possible to compute the distribution of meteorologically-induced system errors with little effort and without recourse to high-speed computers. The procedure has all the accuracy warranted by the meteorological data. It lends itself to optimization of inertial altimetry programs. (Author)

SC-RR-65-620 **Field 22B, 21F**
CFSTI Prices: HC$6.00 MF$1.25
Sandia Corp., Albuquerque, N. Mex.
ROVER/NERVA DESTRUCT SYSTEM TEST RESULTS, ABERDEEN PROVING GROUND-3.
Final rept.,
by R. E. Berry and J. P. Martin. Dec 65, 258p

Contract AT (29-1)-789

Descriptors: (*Space propulsion, Reactor safety fuzes), (*Nuclear propulsion, Destructors).

Identifiers: Rover/Nerva.

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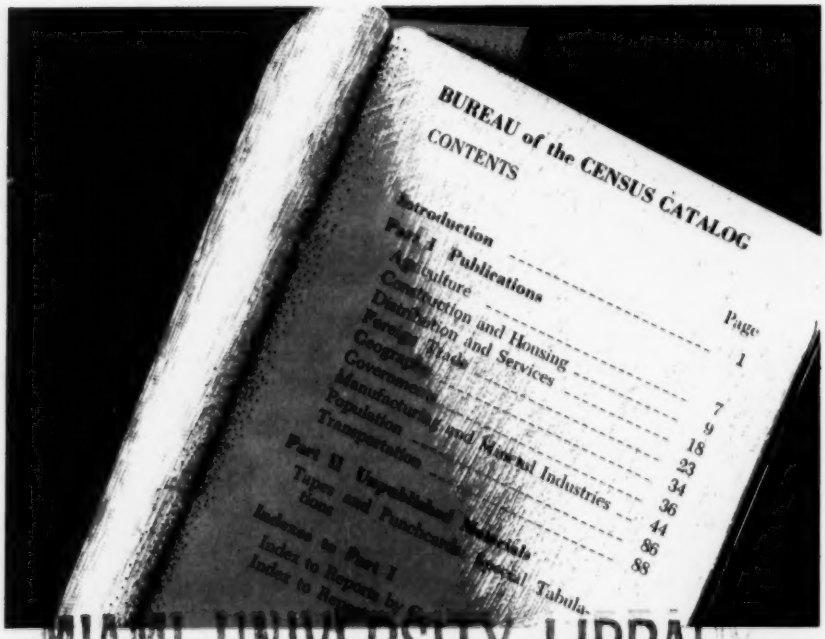

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